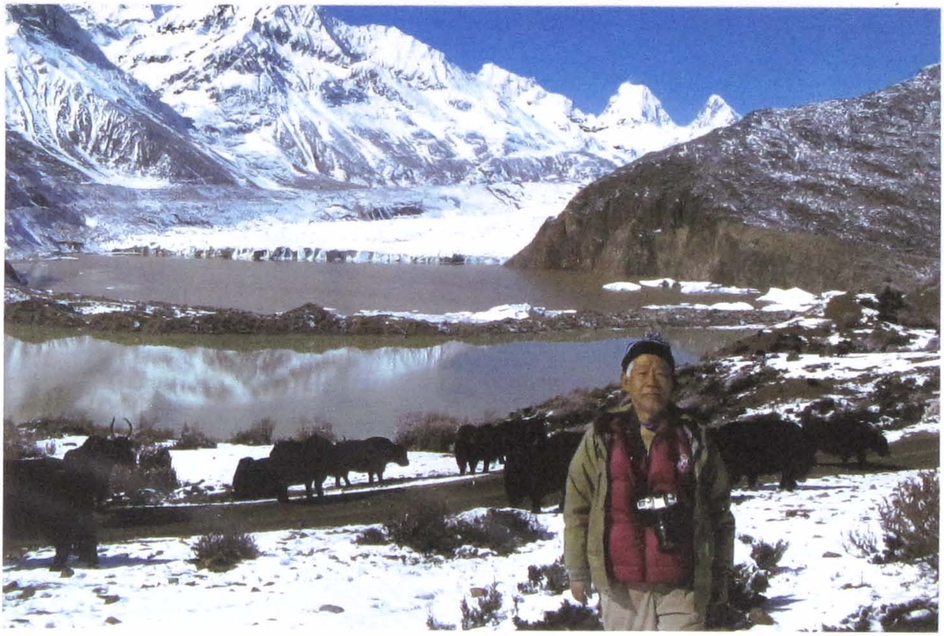
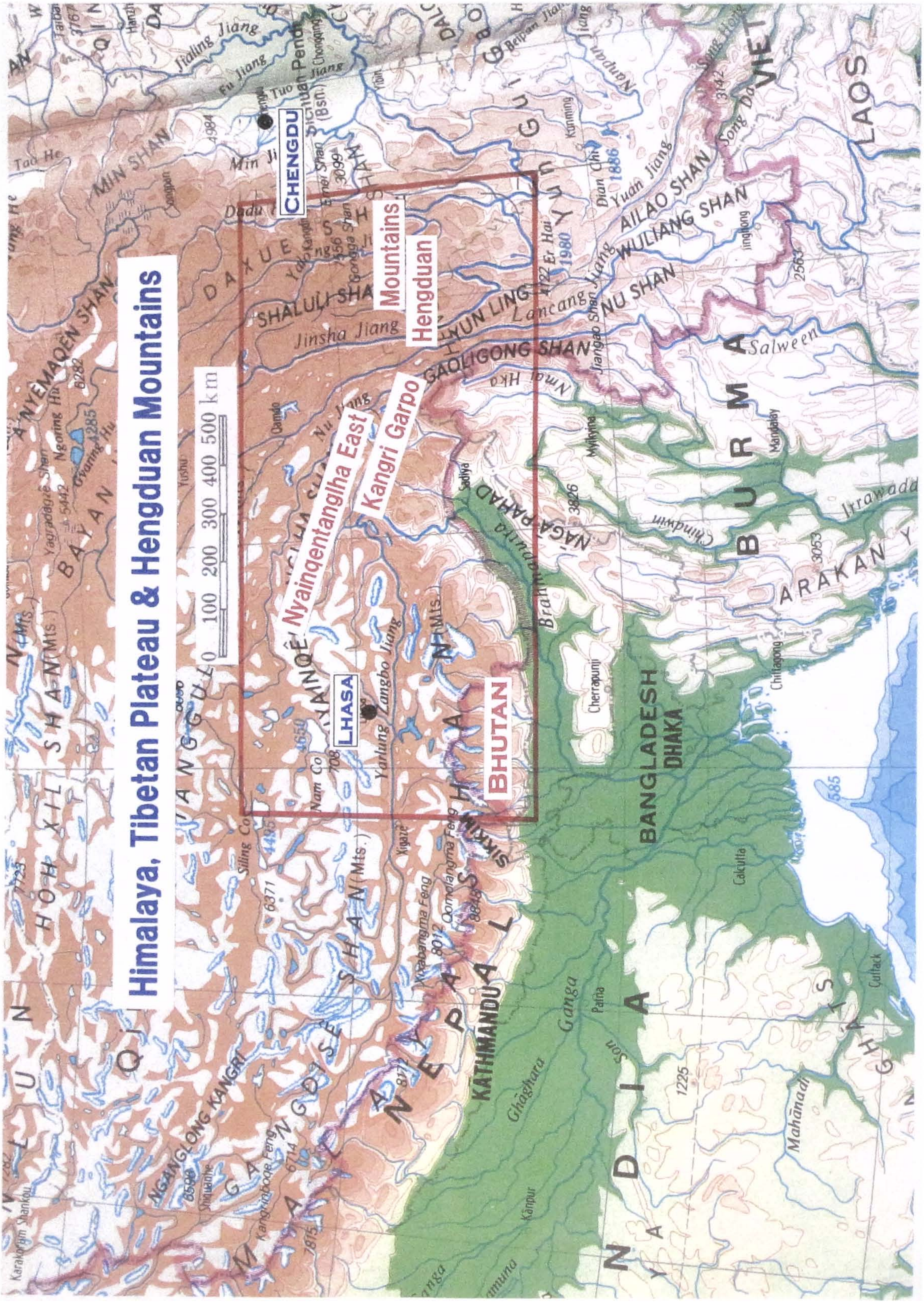
GLACIERS IN EASTERN HIMALAYA

1. Bhutan Himalaya & Khula Kangri
2. East Tibet – Nyainqentanglha East
3. East Tibet – Kangri Garpo East
4. Hengduan Mountains-Gorge Country



Tamotsu Nakamura

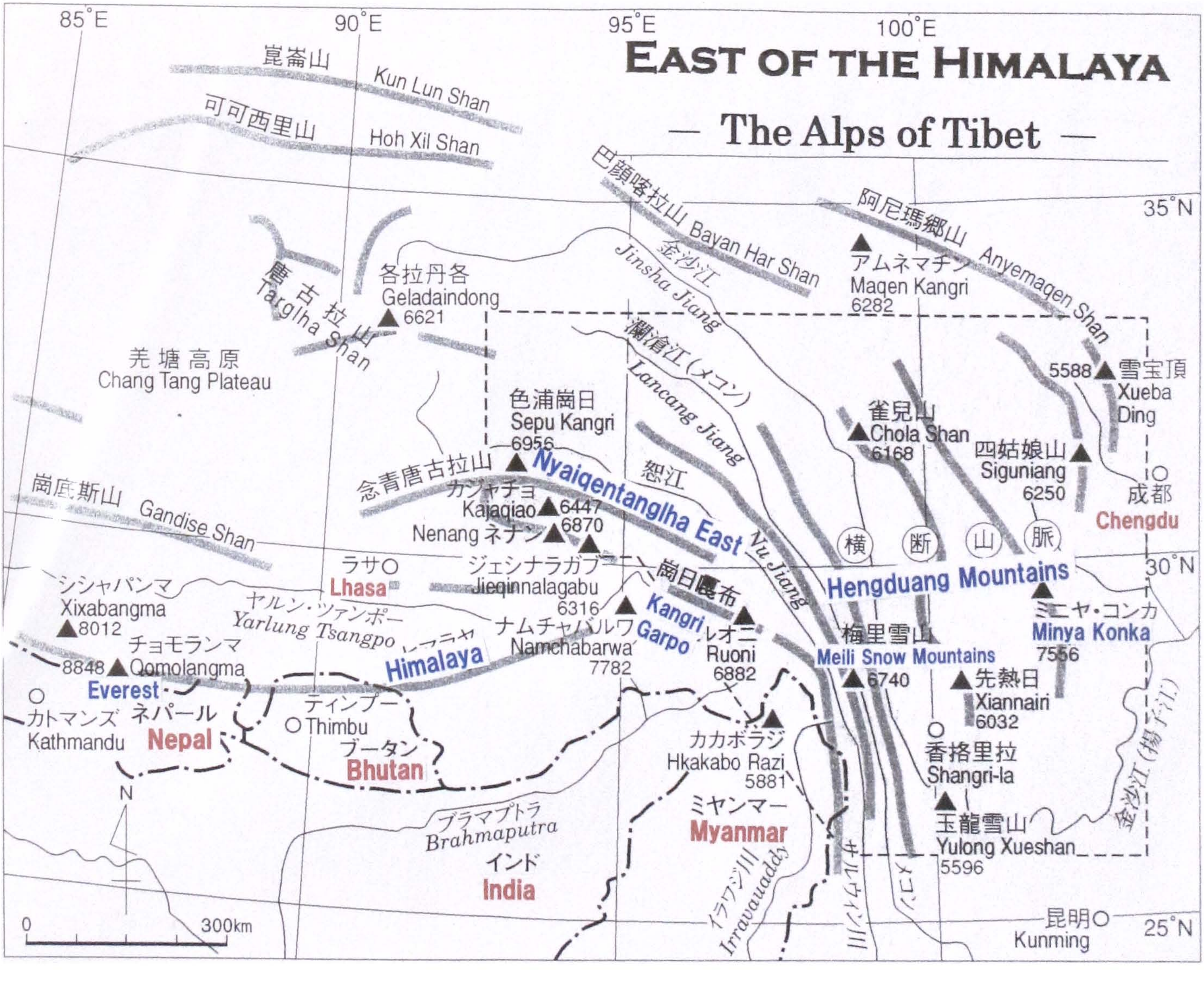
The AAC Annual General Meeting March 2007



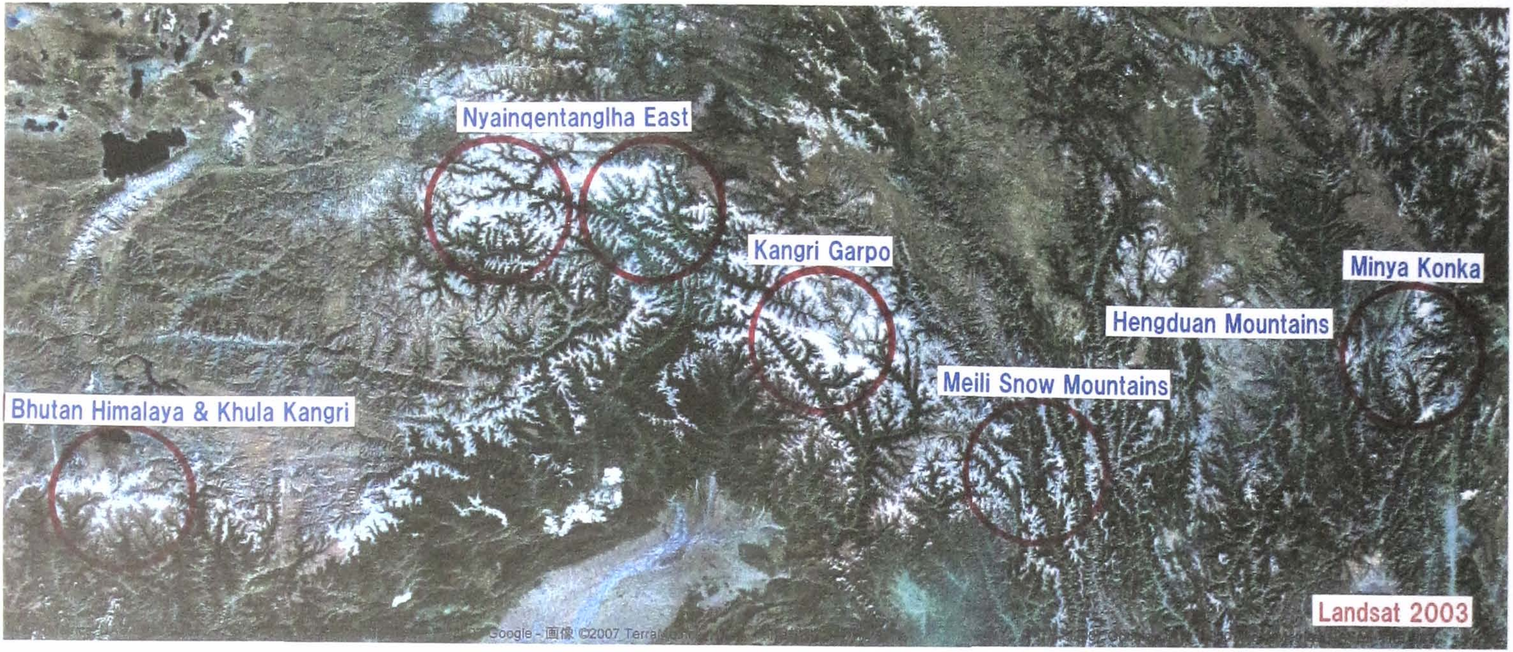
Himalaya, Tibetan Plateau & Hengduan Mountains

EAST OF THE HIMALAYA

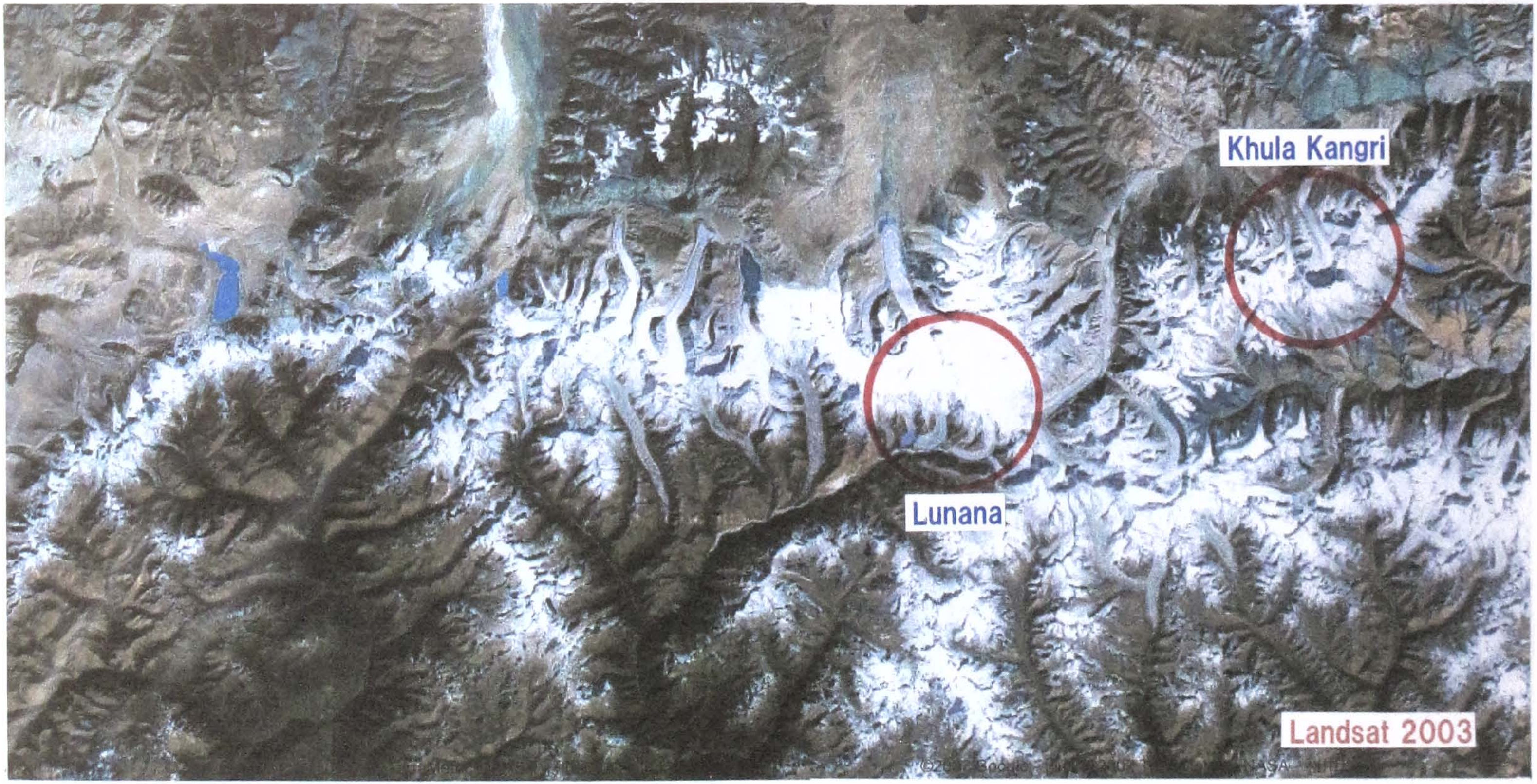
— The Alps of Tibet —



Glaciers
in Eastern Himalaya



1. Bhutan Himalaya & Khula Kangri



Information source on Bhutan: Prof. Shuji Iwata

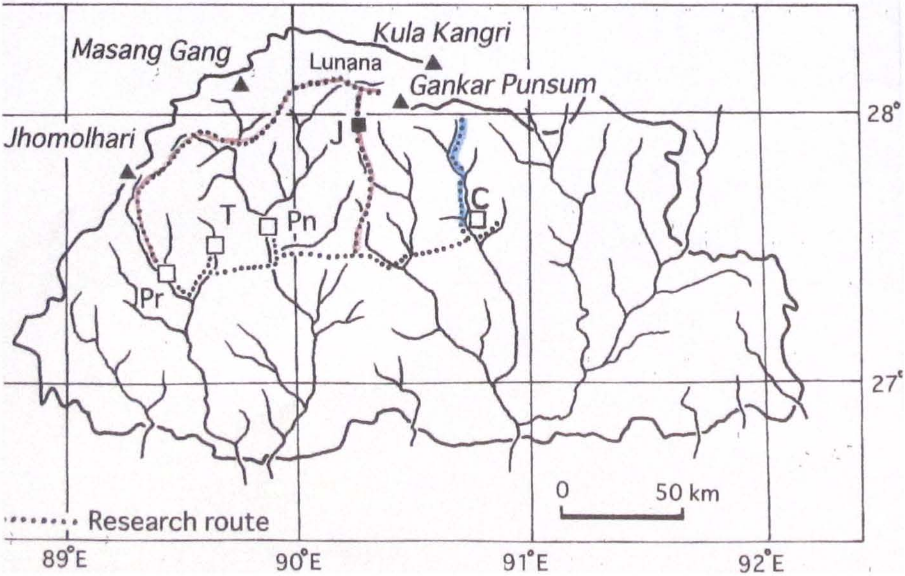
Glaciers in the Bhutan Himalaya

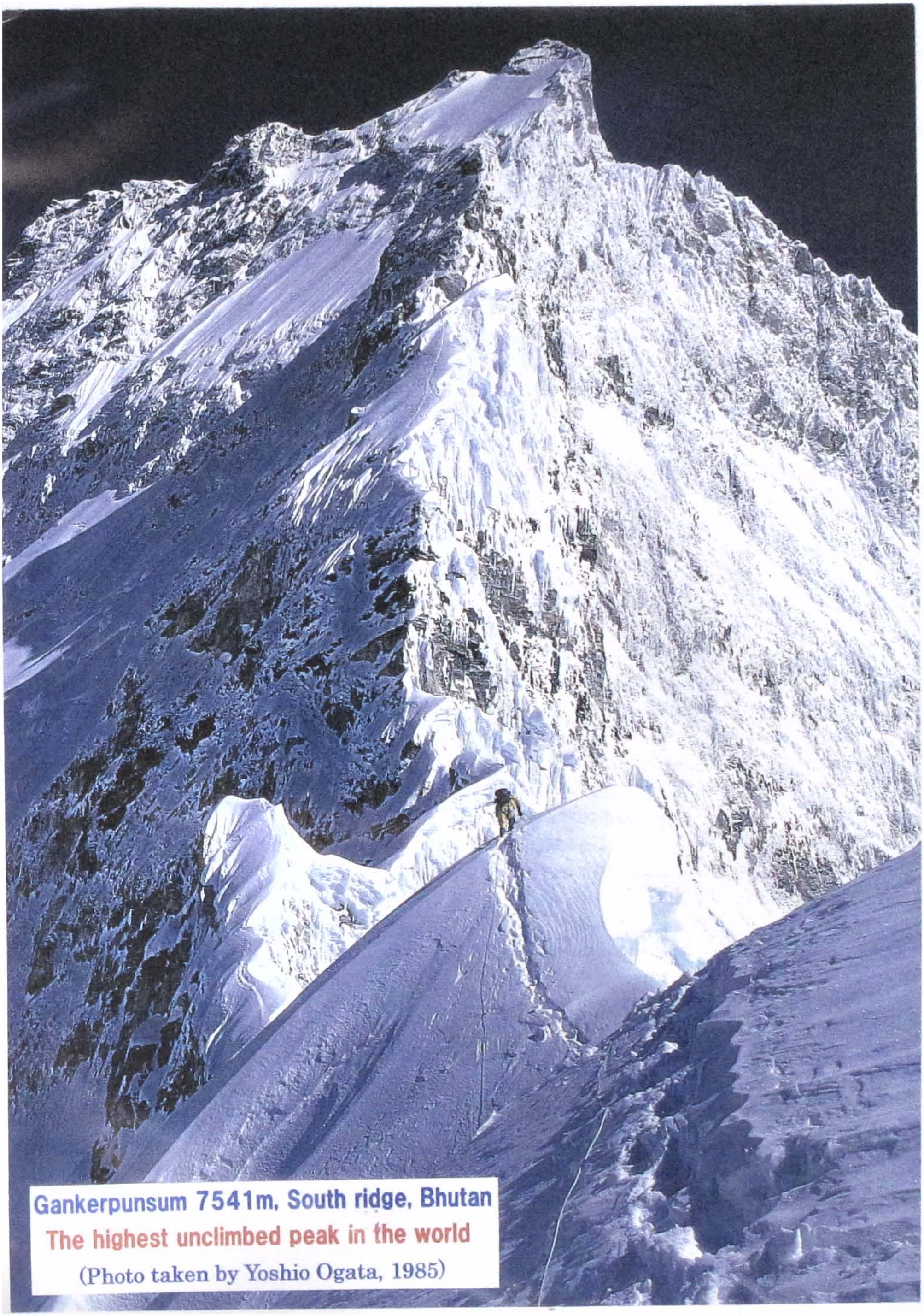
Global Warming makes Glacier Lakes

"Tears of Earth"

Scientists of Glaciology are paying a keen attention to the glacier lakes in Thanza., Lunana District of the Bhutan Himalaya. These are the Lake Luge (east) and the Lake Lafustren (west). The both lakes are dammed by a large glacier tongue of the Tortumi Glacier of 5km long and 1km wide. A western half of the Tortumi glacier is covered with muddy water and there are small ponds in the rest part. It would not take much time till it grows to a glacier lake.

UNEP report of 2002 mentions that there exist approx. 5,000 glacier lakes in the Himalaya and its vicinity and the average temperature in the area has increased by one degree C in 32 years. 24 glacier lakes of Bhutan are being exposed to danger of collapsing. In 1994 the Lake Luge was broken and muddy stream with rocks and trees reached to Punaka 70km away from the lake. The water level of the lake became lower by 25m.





Gankerpunsum 7541m, South ridge, Bhutan

The highest unclimbed peak in the world

(Photo taken by Yoshio Ogata, 1985)

Gankerpunsum 7541m, South face and Debri-mantled valley glaciers

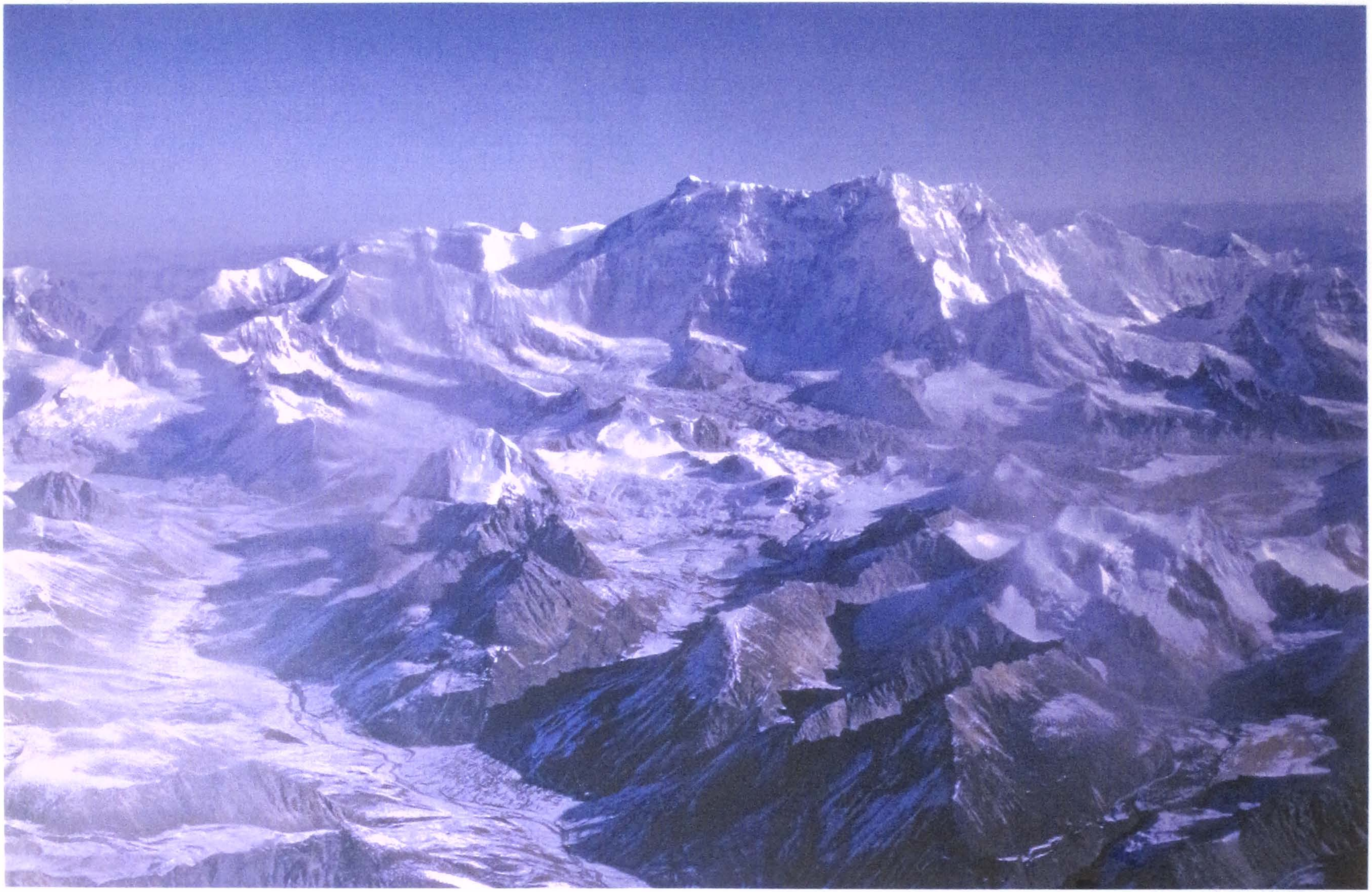
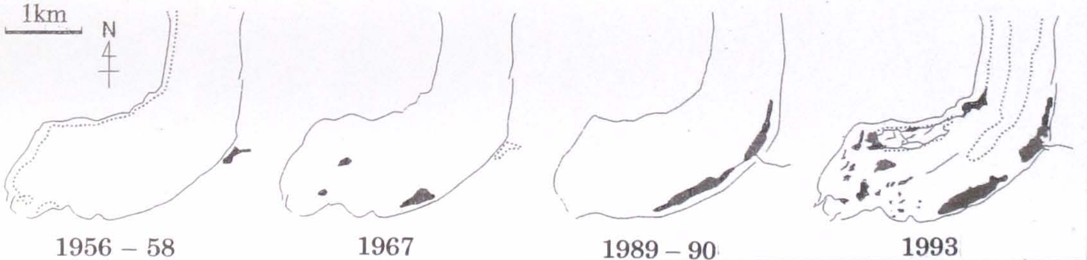


Photo by Francoise Pommeret

Third lake is being born on Tortumi Glacier between Lake Lafustren & Lake Luge.



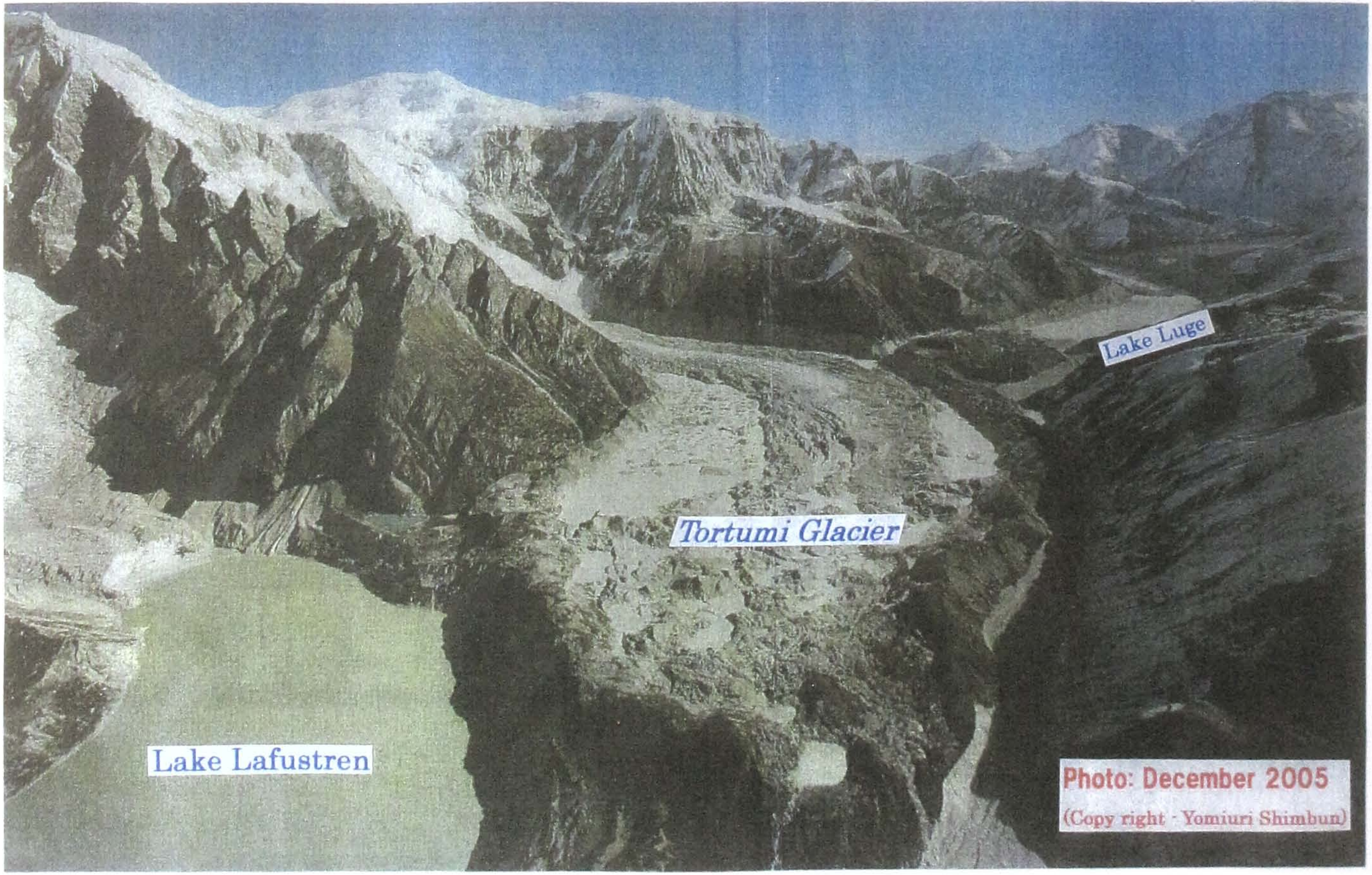
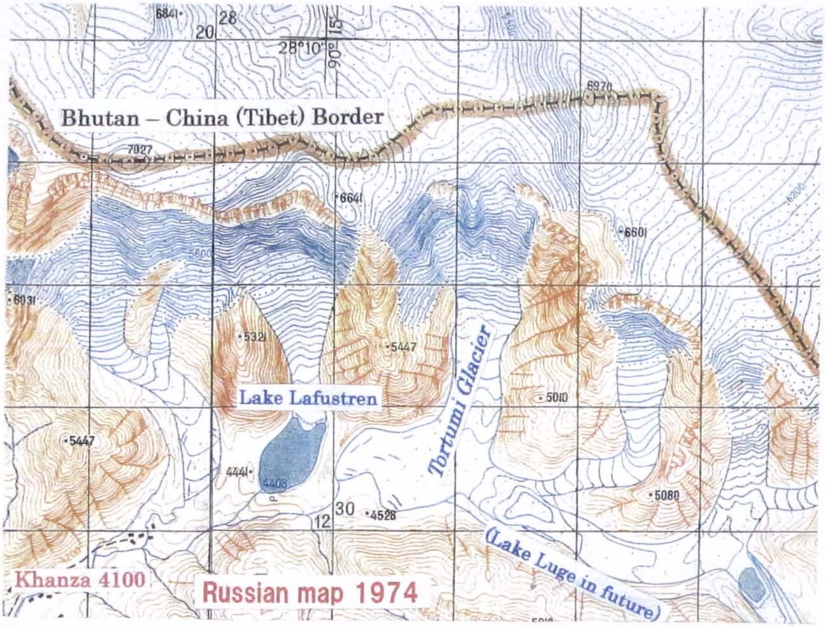
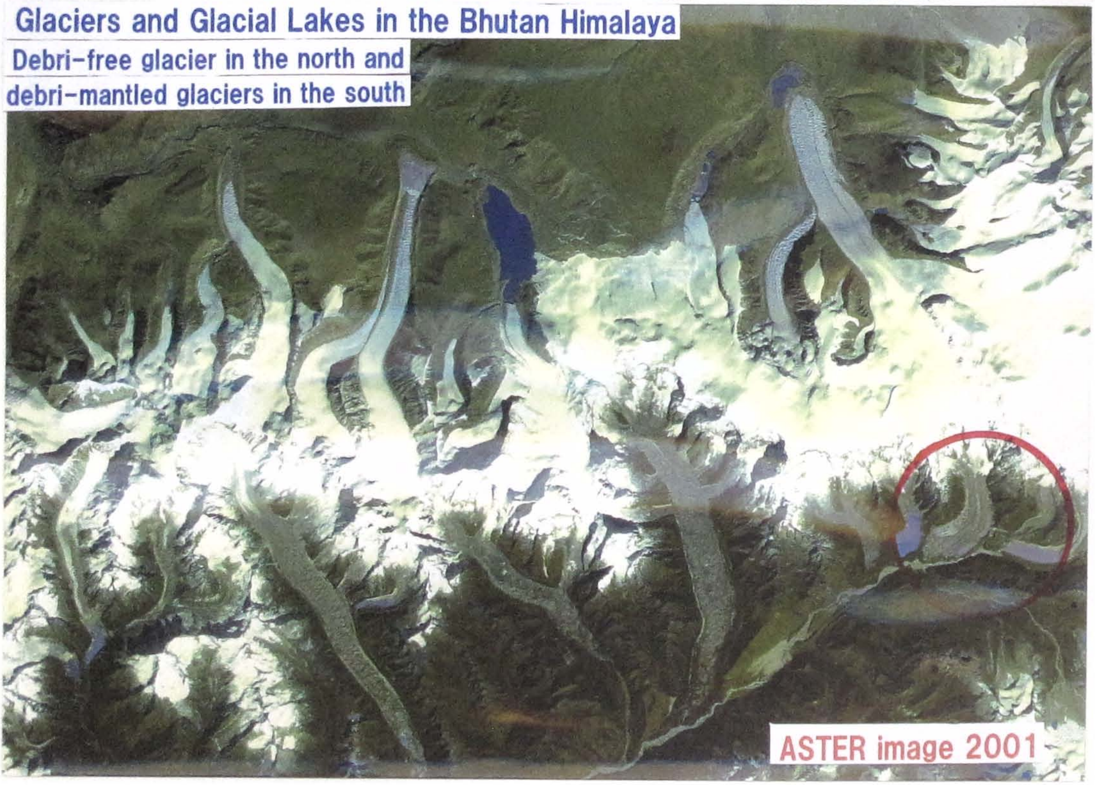


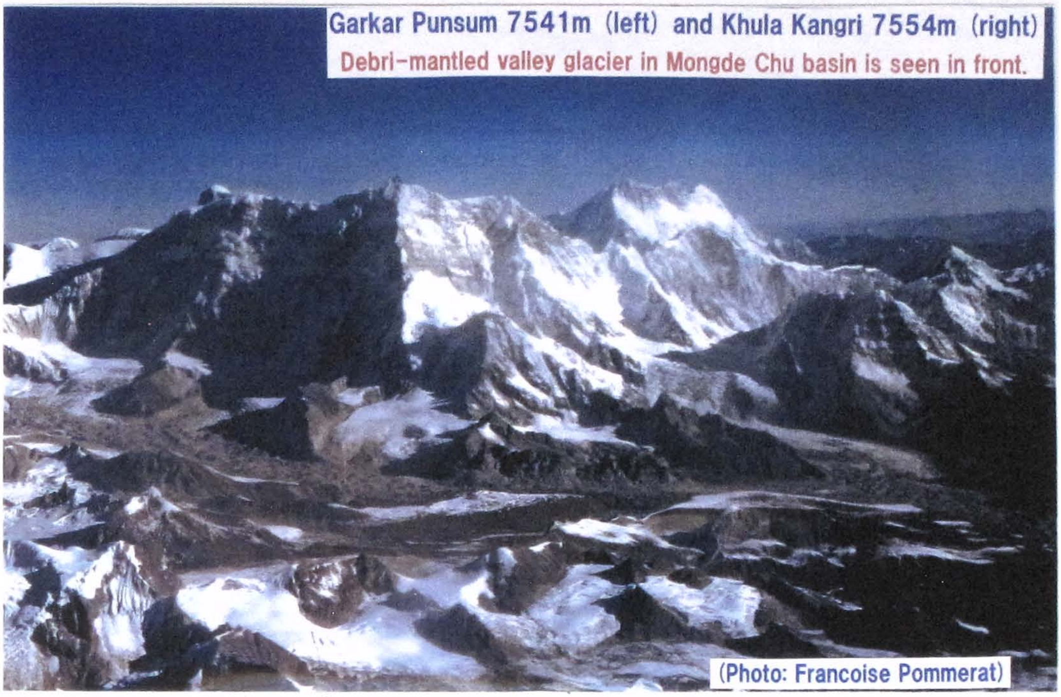
Photo: December 2005
(Copy right - Yomiuri Shimbun)



Glaciers and Glacial Lakes in the Bhutan Himalaya

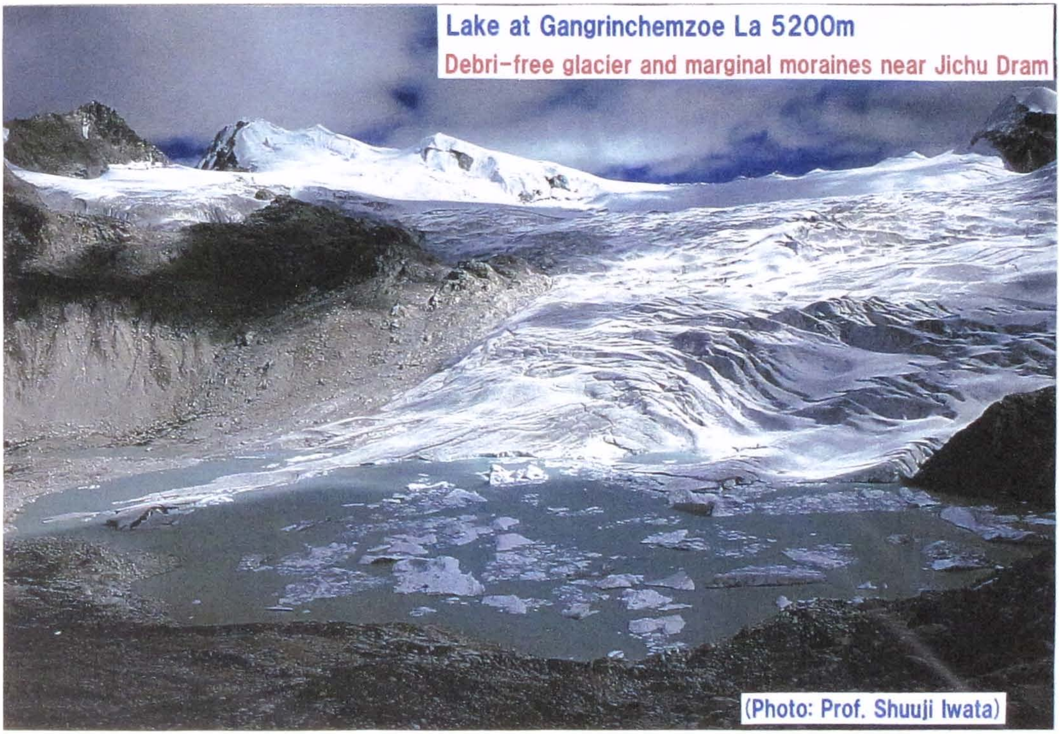
Debri-free glacier in the north and debri-mantled glaciers in the south




Garkar Punsum 7541m (left) and Khula Kangri 7554m (right)

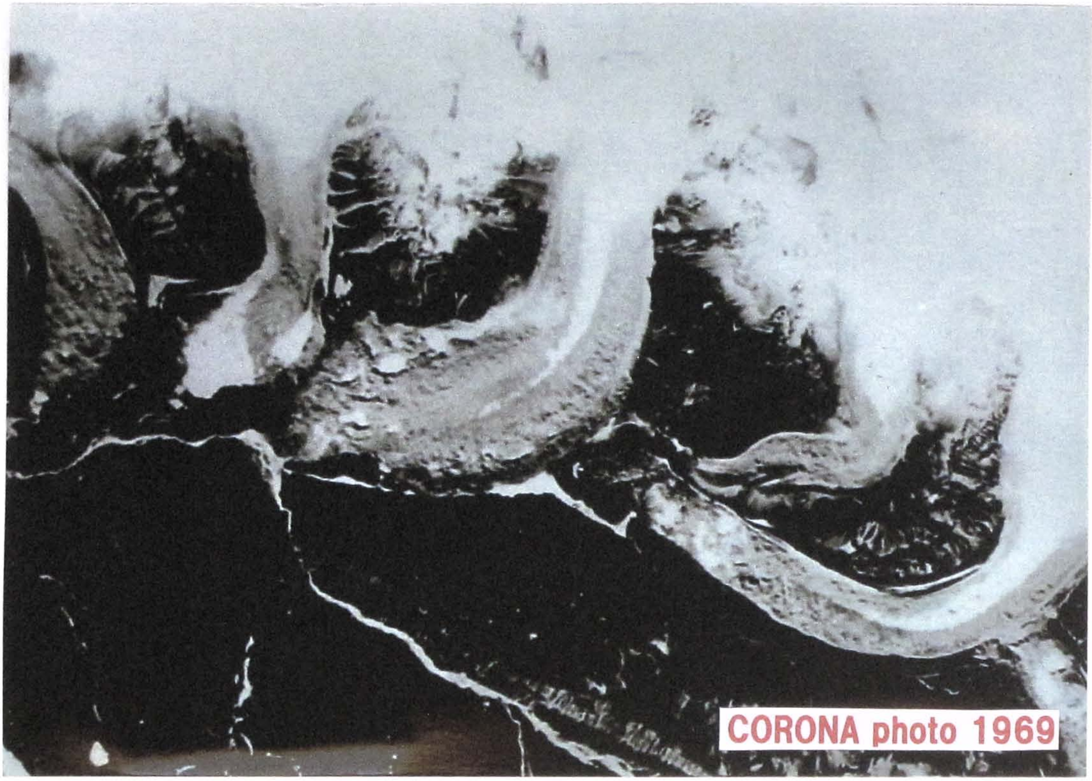
Debri-mantled valley glacier in Mongde Chu basin is seen in front.

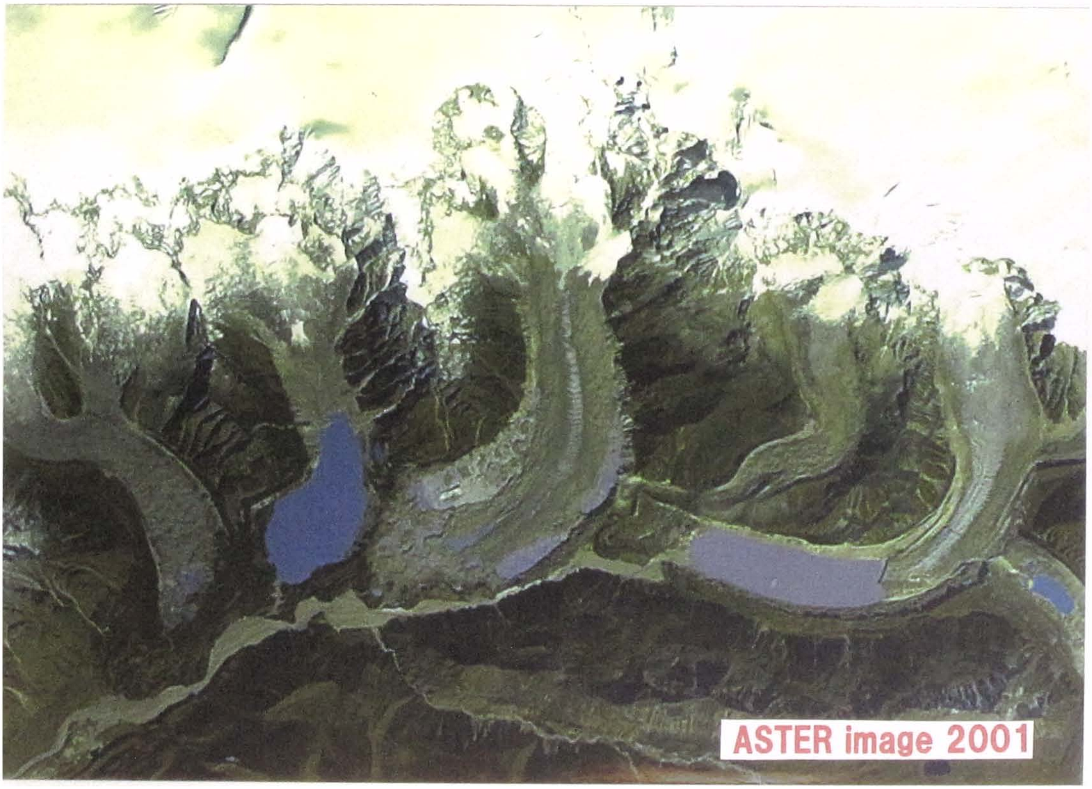
(Photo: Francoise Pommerat)

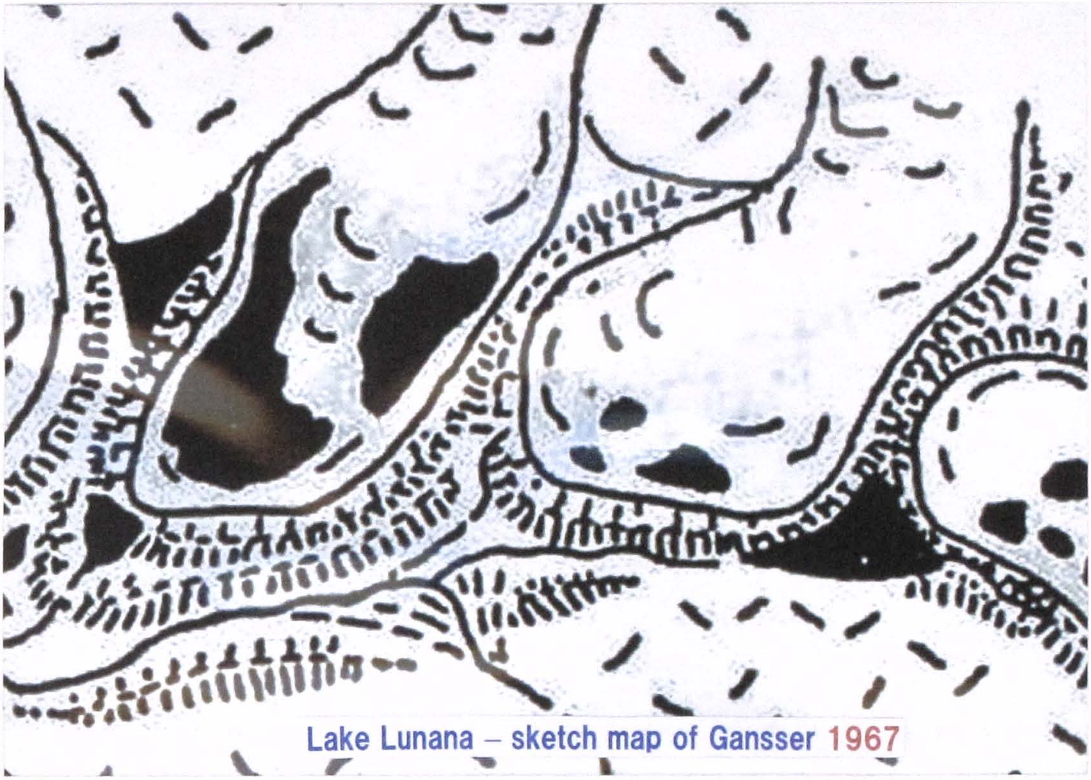

Lake at Gangrinchemzoe La 5200m

Debri-free glacier and marginal moraines near Jichu Dram

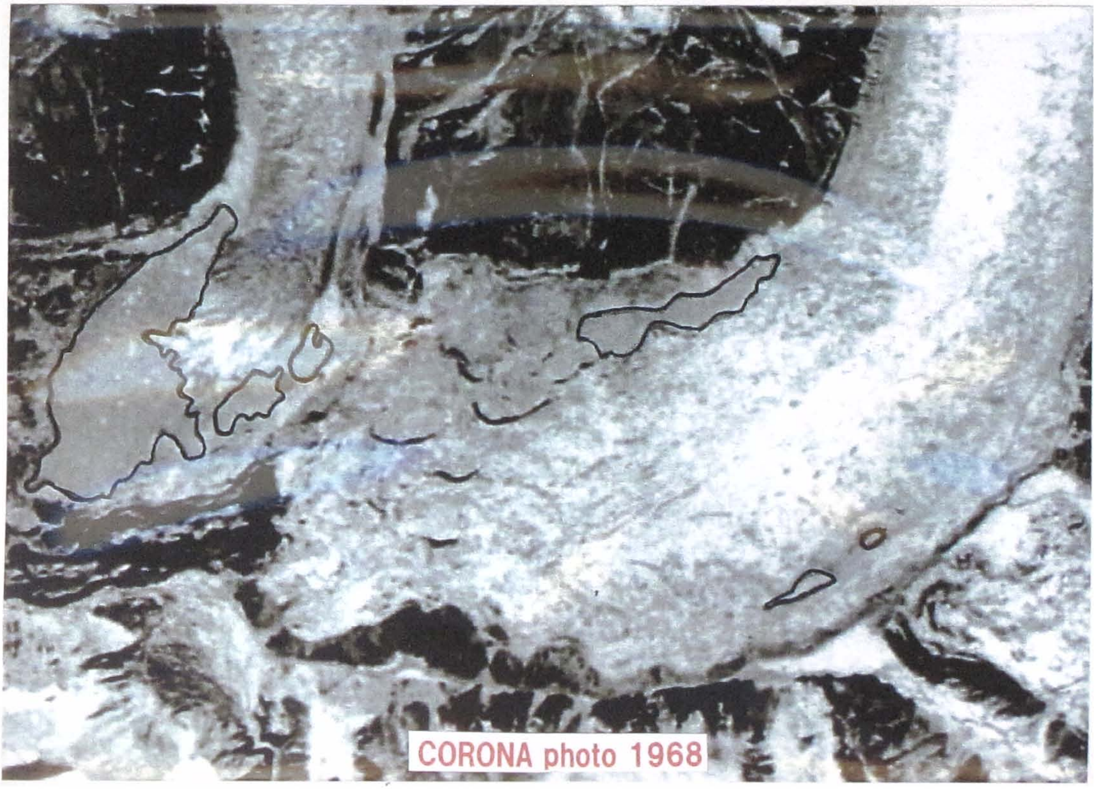
(Photo: Prof. Shuuji Iwata)


CORONA photo 1969


ASTER image 2001

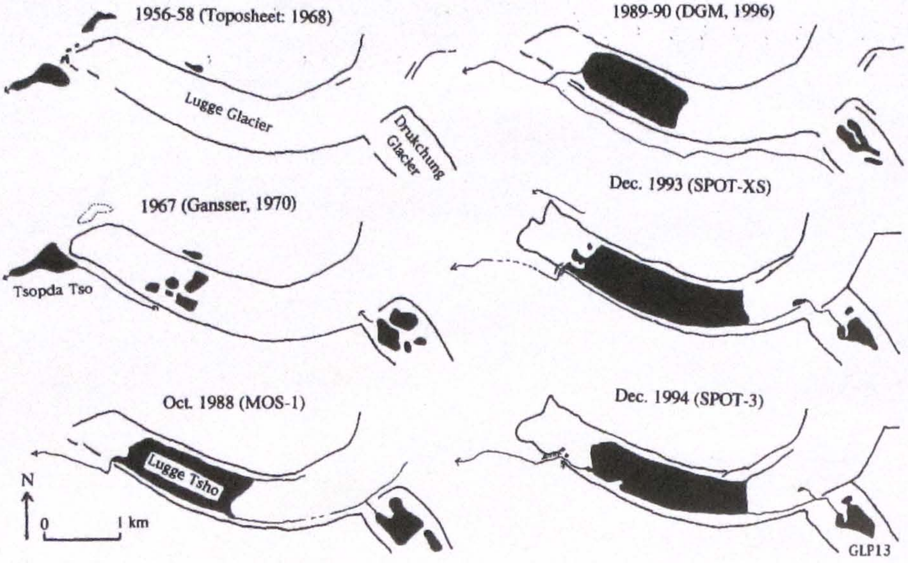


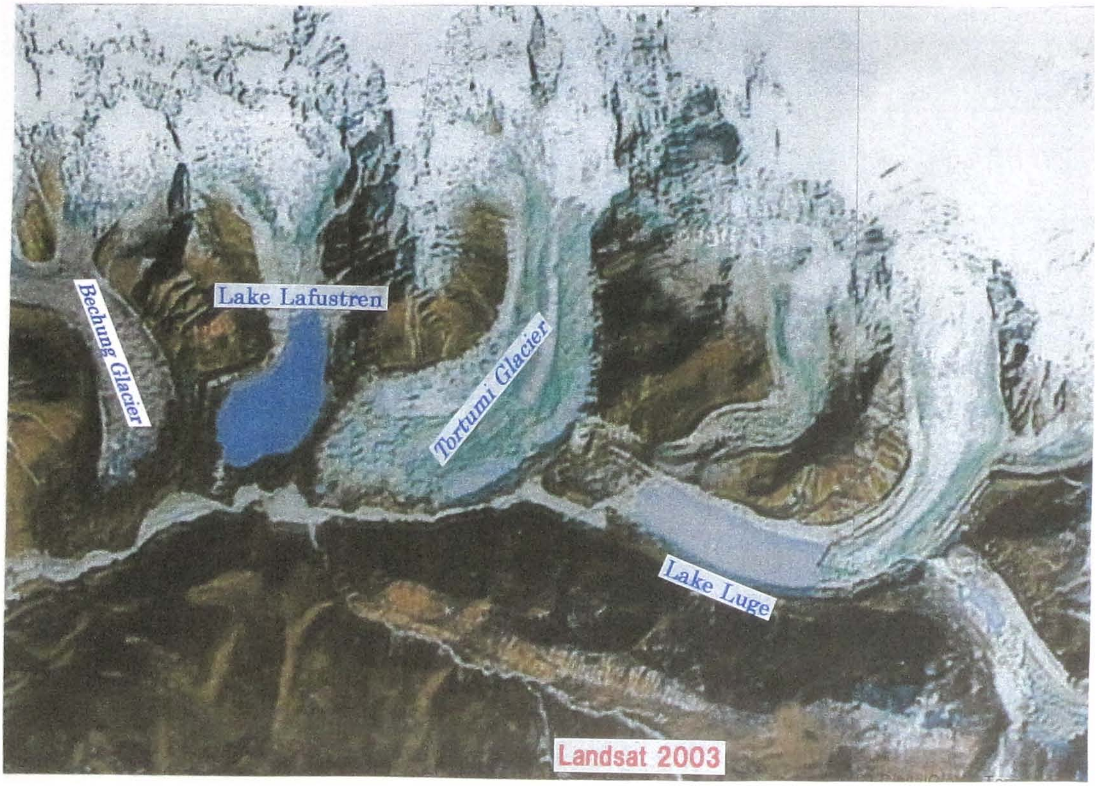
Lake Lunana – sketch map of Gansser 1967

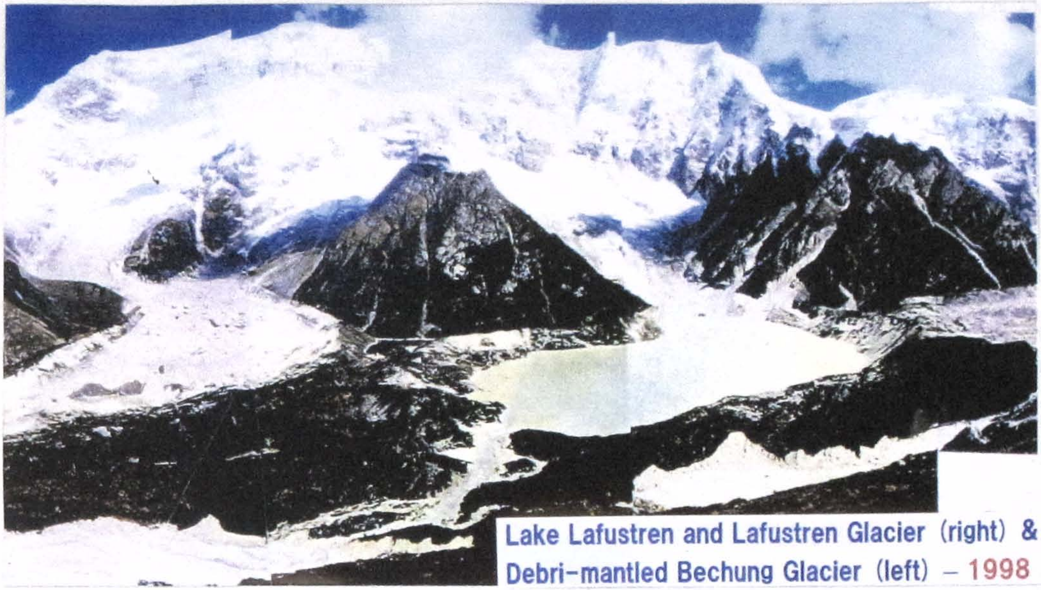


CORONA photo 1968

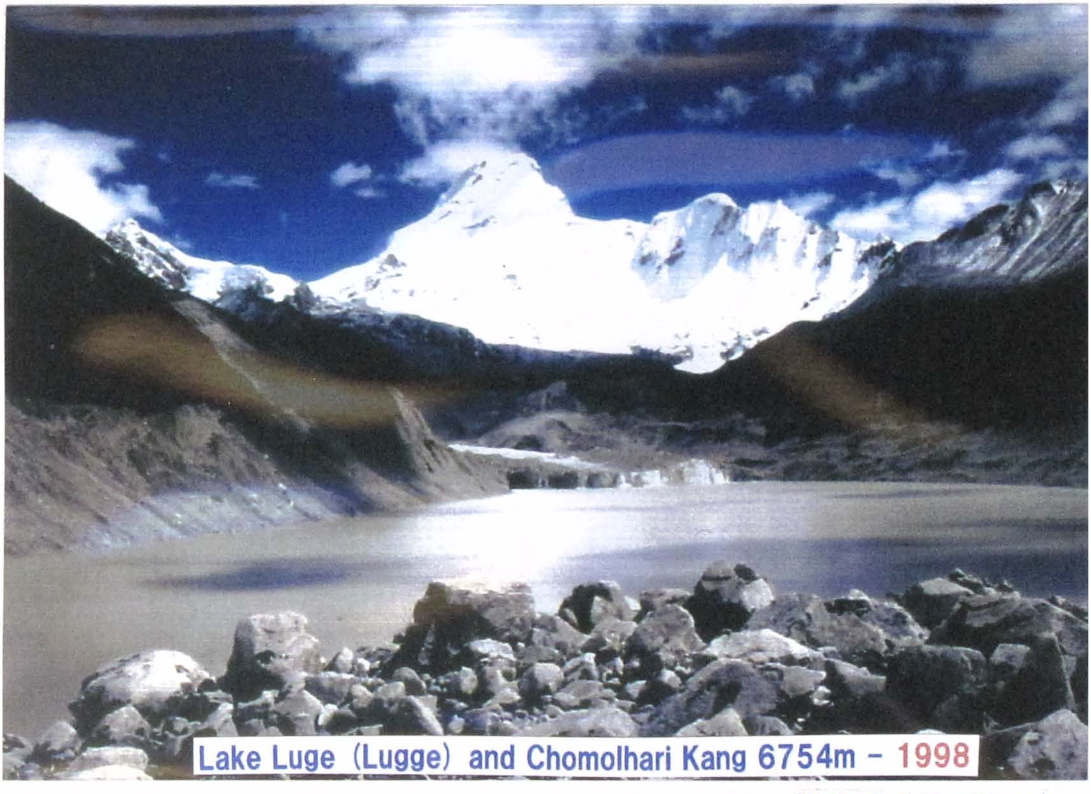
Change of Luge (Lugge) Glacier and Lake







Lake Lafustren and Lafustren Glacier (right) &
Debri-mantled Bechung Glacier (left) - 1998



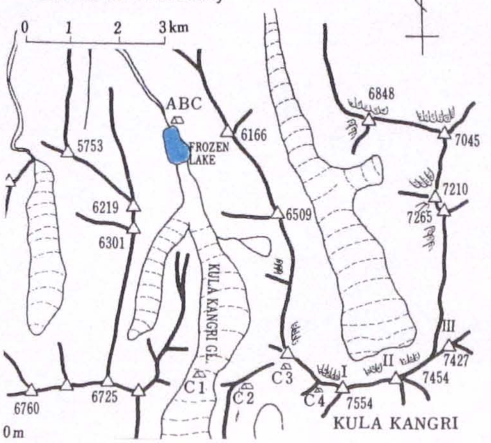
Lake Luge (Lugge) and Chomolhari Kang 6754m - 1998

(Photo: Prof. Shuuji Iwata)

Glaciers of Khula Kangri 7554m south of Lhasa

– Eastern Himalaya north of China–Bhutan Border –

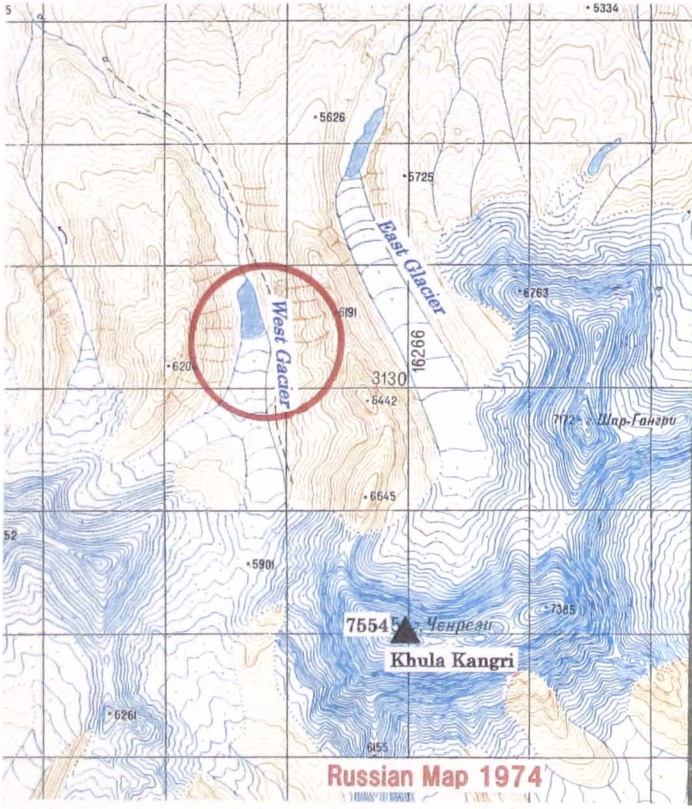
1986 - Kobe University



Comparison of Russian Map 1974 and Landsat 2003 image indicates:

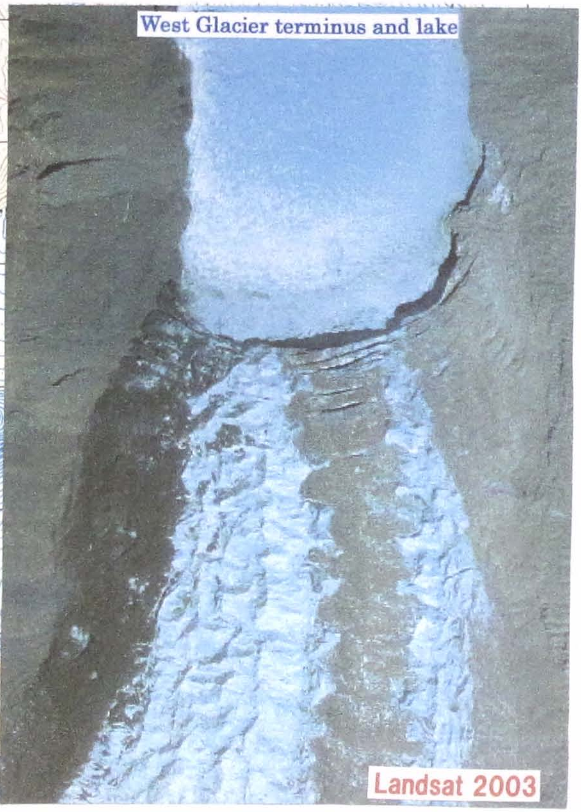
1. **West Glacier –The glacier retreated by about 300m in 30 years and the glacier lake became larger accordingly.**

2. **East Glacier – The glacier retreated by about 300m in 30 years and the glacier lake moved to south accordingly.**

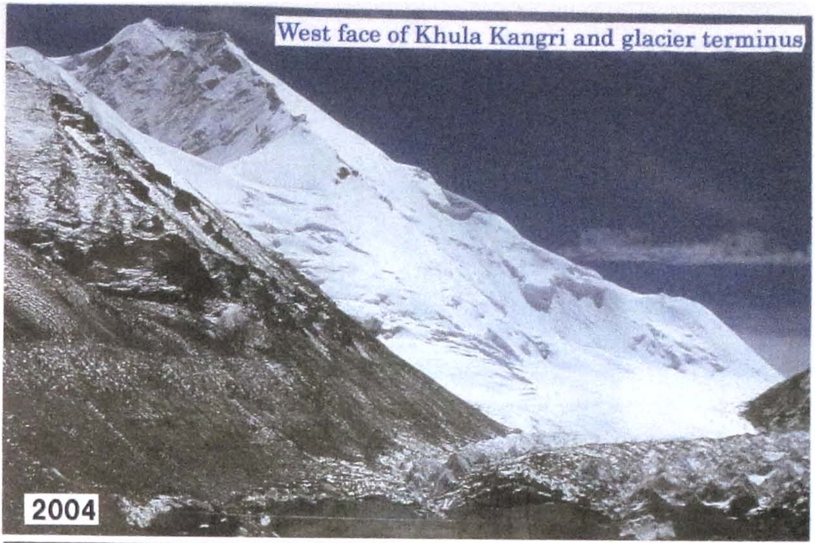


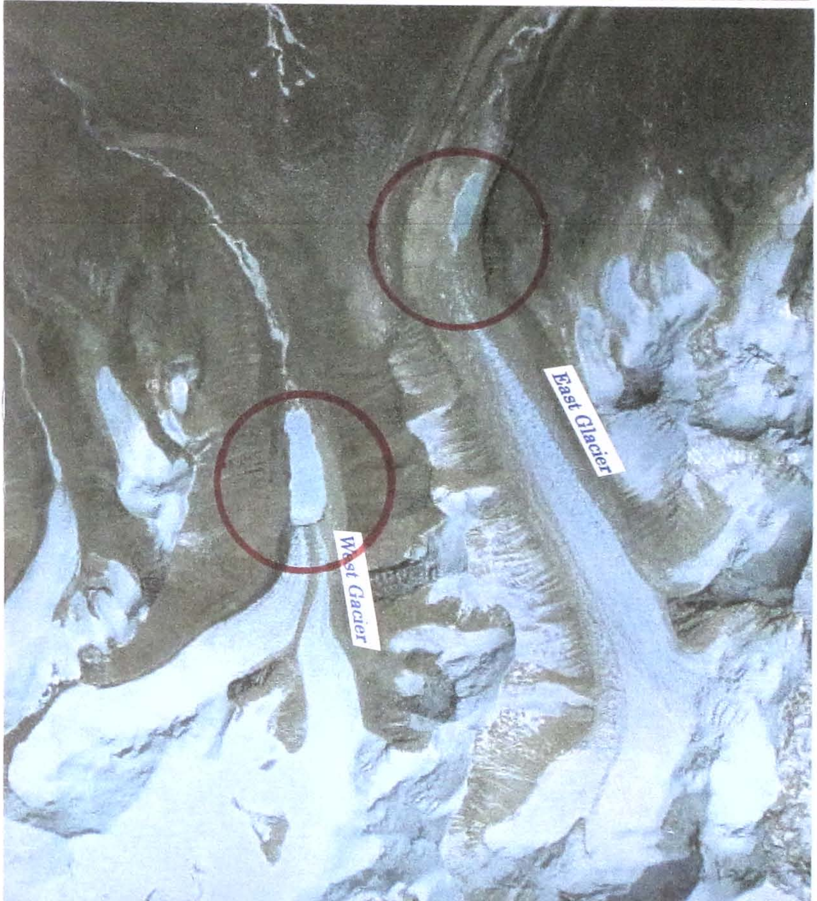
Russian Map 1974

West Glacier terminus and lake



Landsat 2003

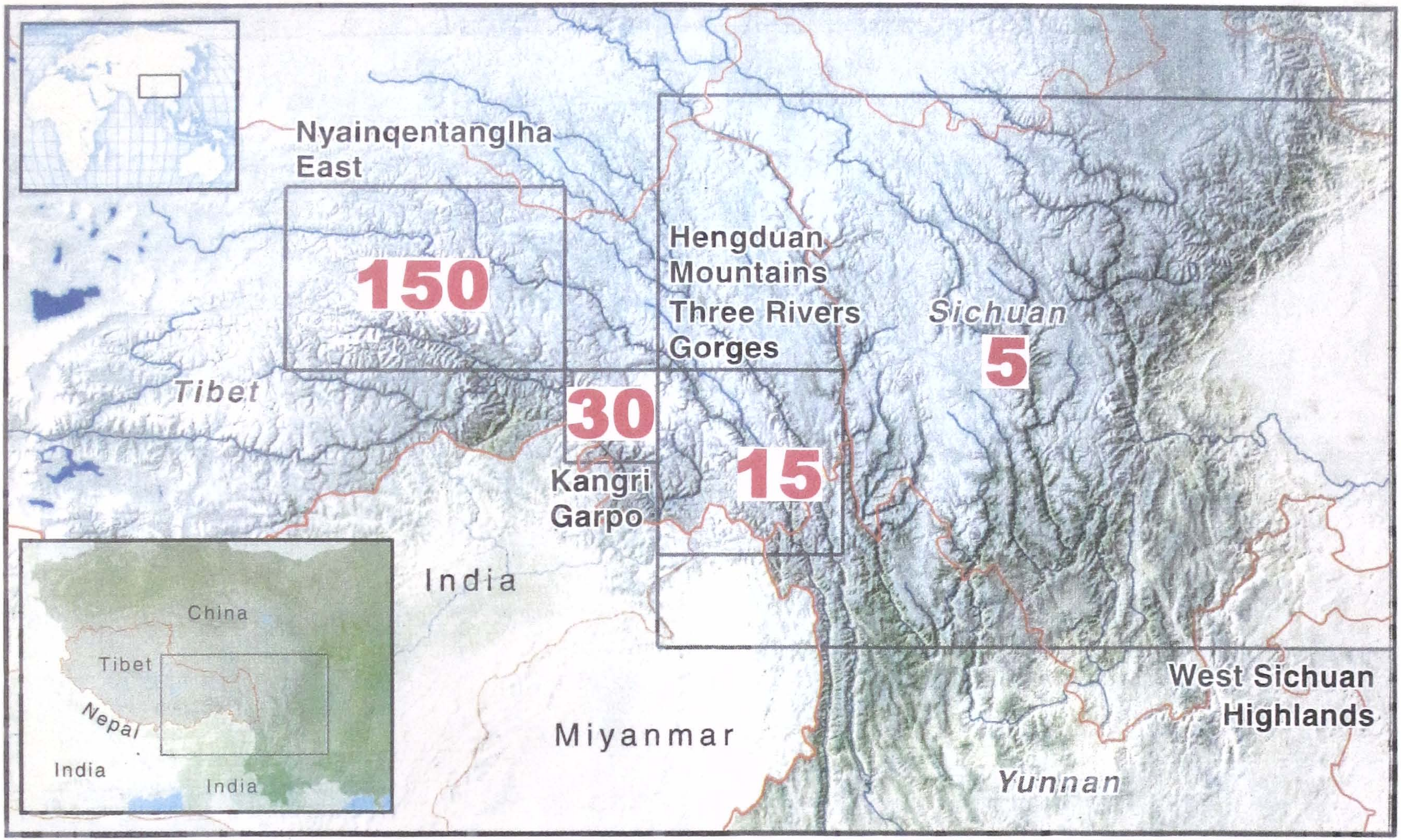

West face of Khula Kangri and glacier terminus
2004


East Glacier
West Gacier
Khula Kangri 7554m
Landsat 2003

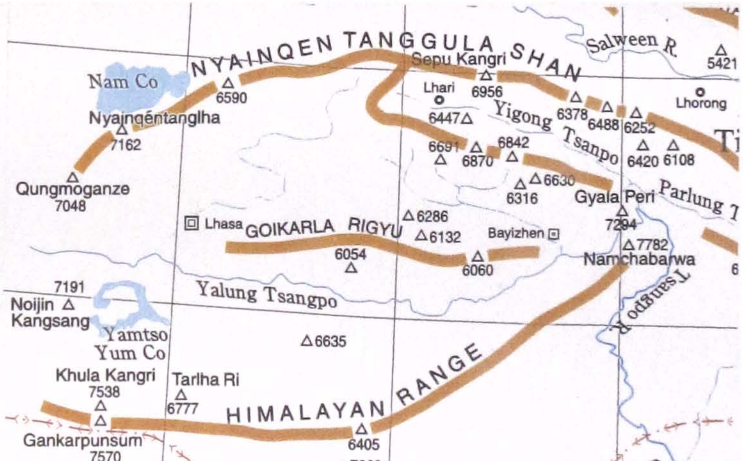
EAST OF THE HIMALAYA

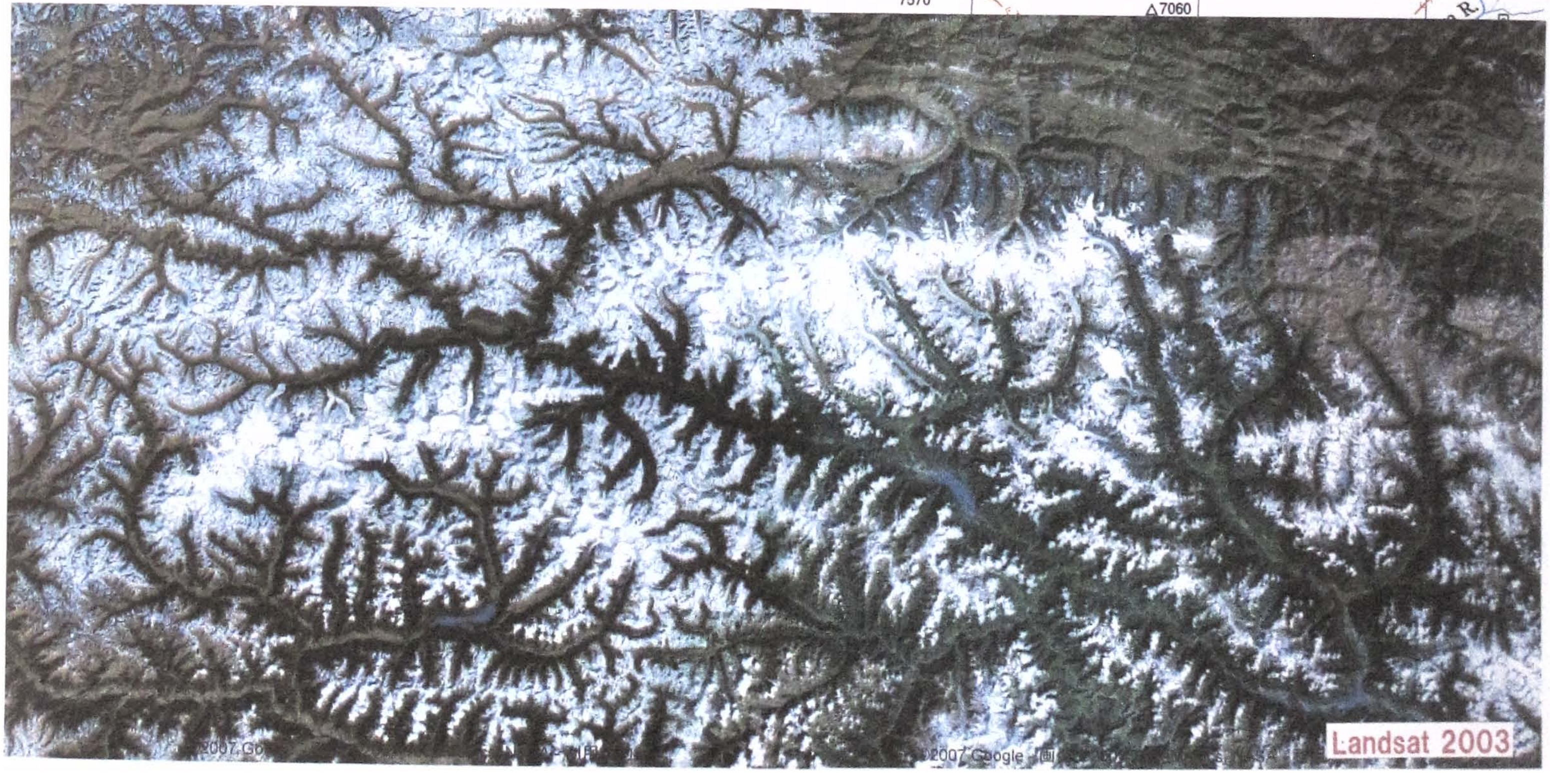
200 Unclimbed 6,000m Peaks

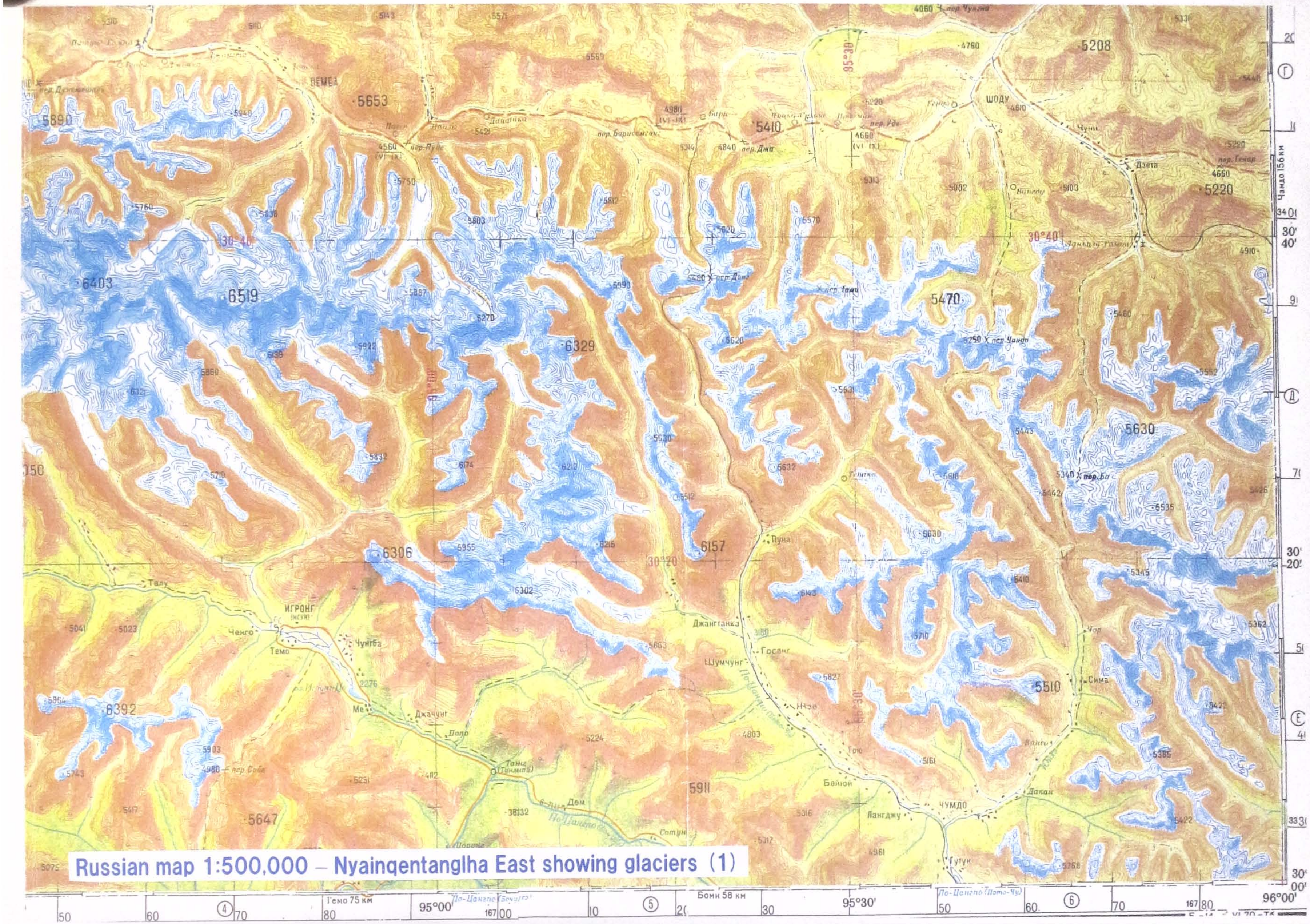
March 2007



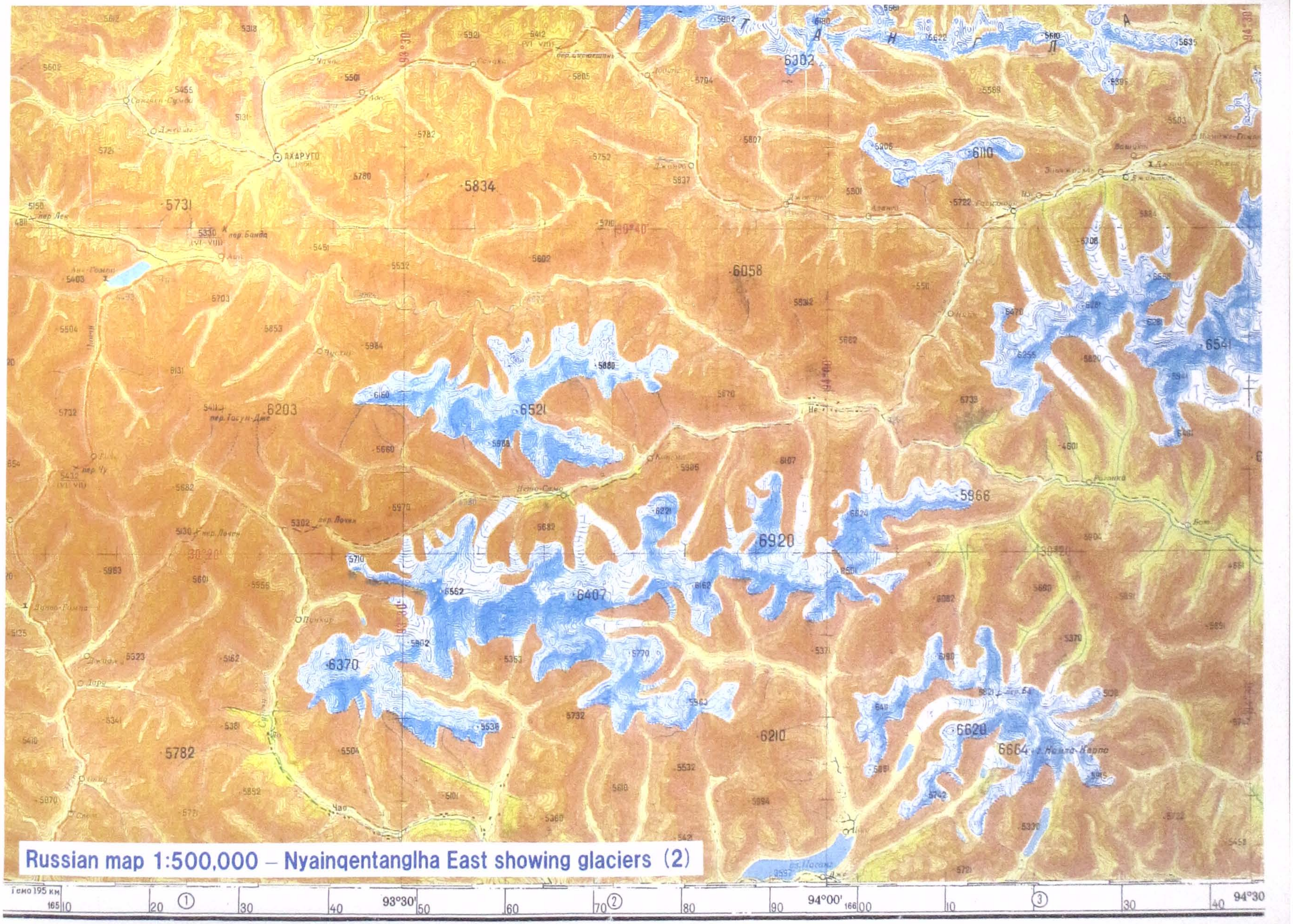
2. East Tibet
-Nyainqentanglha East



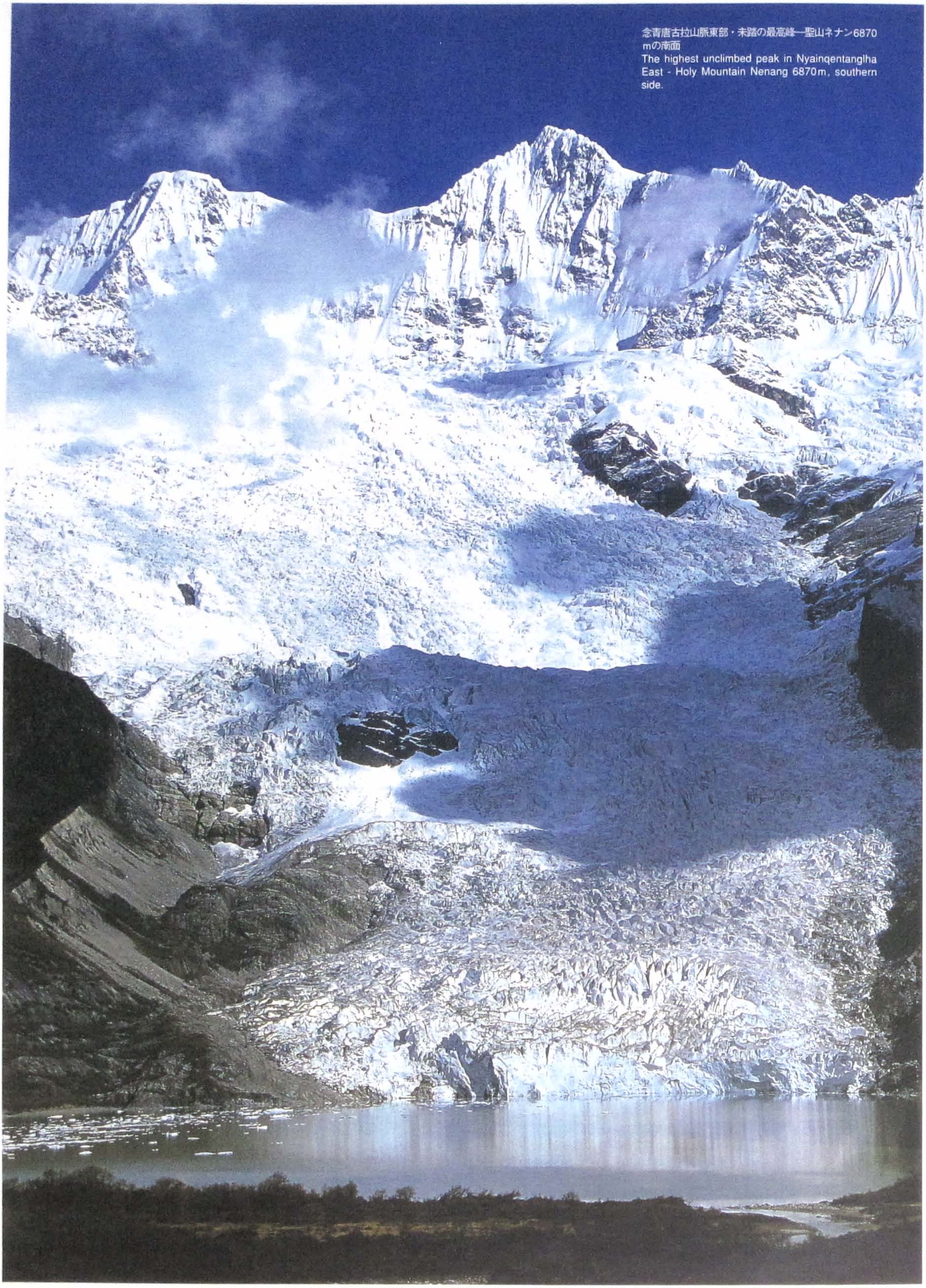




Russian map 1:500,000 – Nyainqentanglha East showing glaciers (1)



Russian map 1:500,000 – Nyainqentanglha East showing glaciers (2)

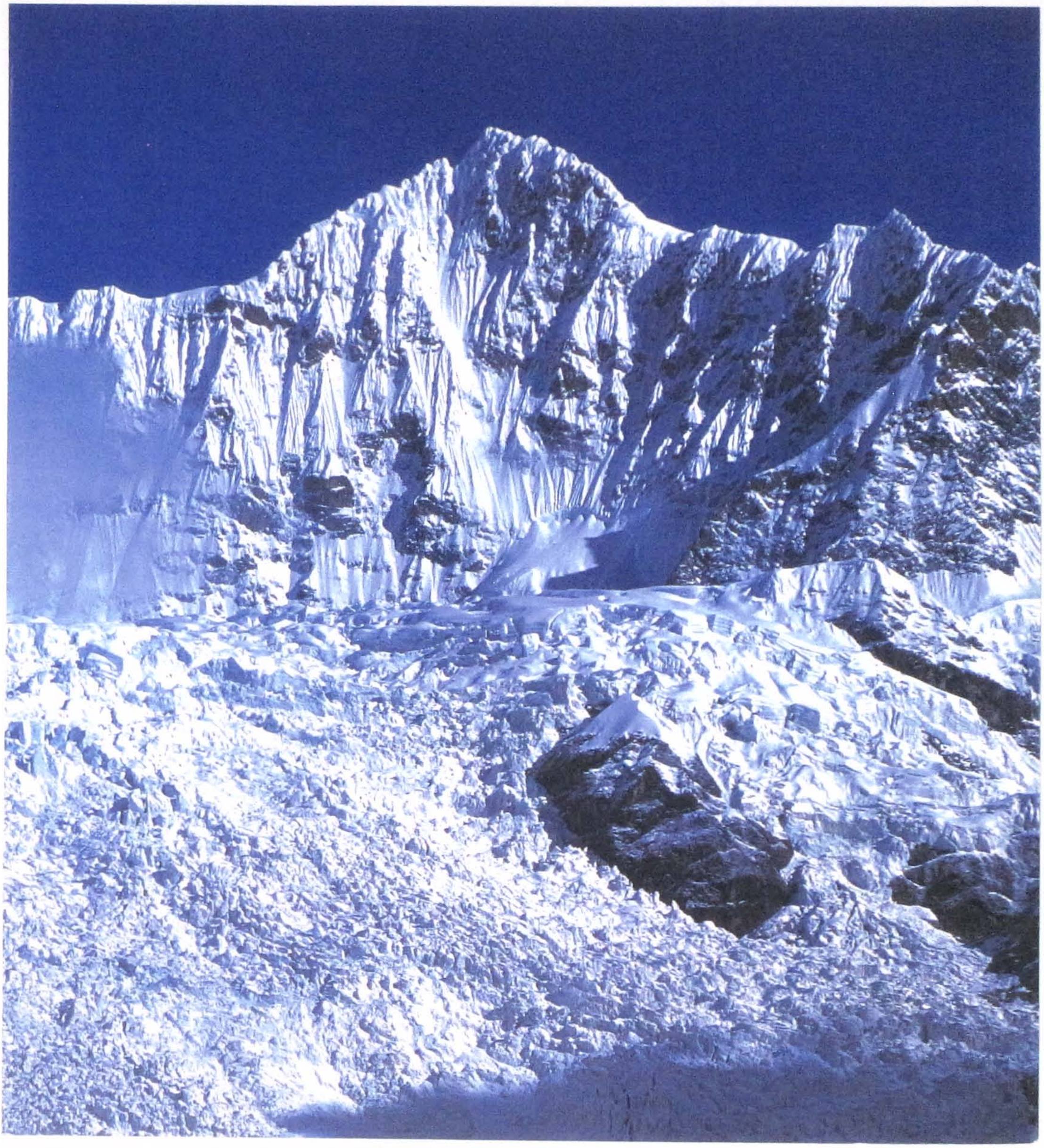


念青唐古拉山脈東部・未踏の最高峰一聖山ネナン6870mの南面

The highest unclimbed peak in Nyainqentanglha East - Holy Mountain Nenang 6870m, southern side.

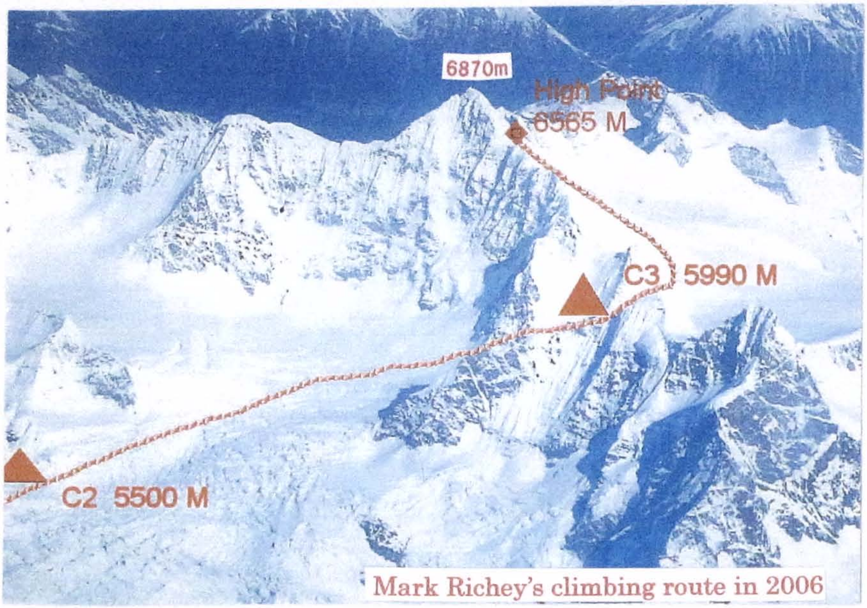
South Face of Holy Mountain "Nenang"

The highest virgin peak in Nyainqentanglha East – East Tibet

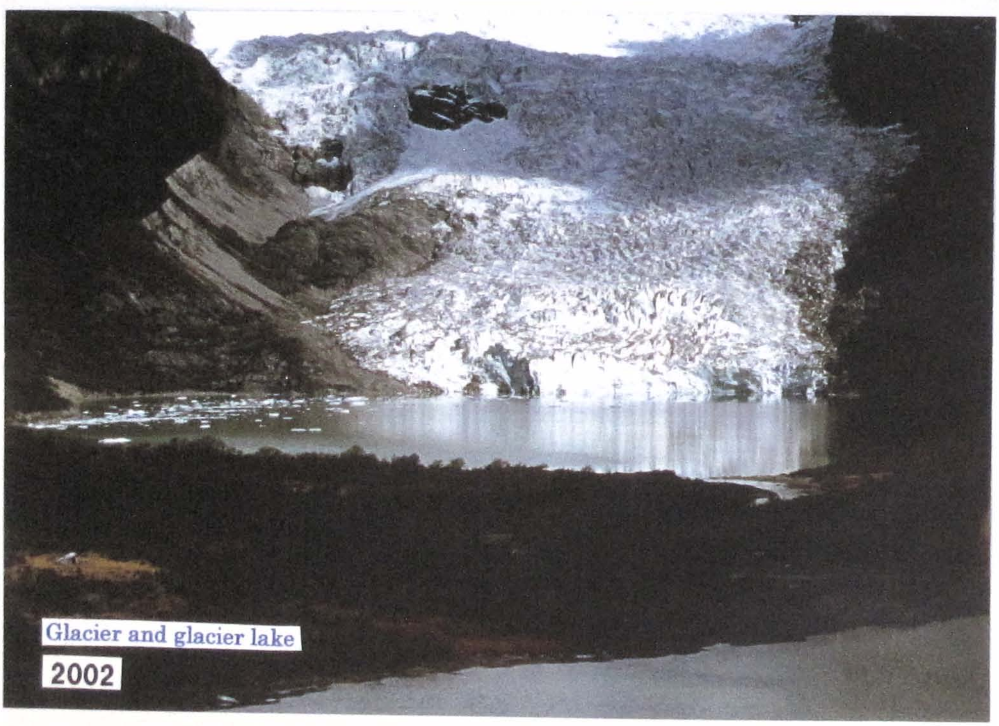


Glacier of the South Face of Nenang 6870m

- Highest Unclimbed Peak in Nyainqentanglha East -



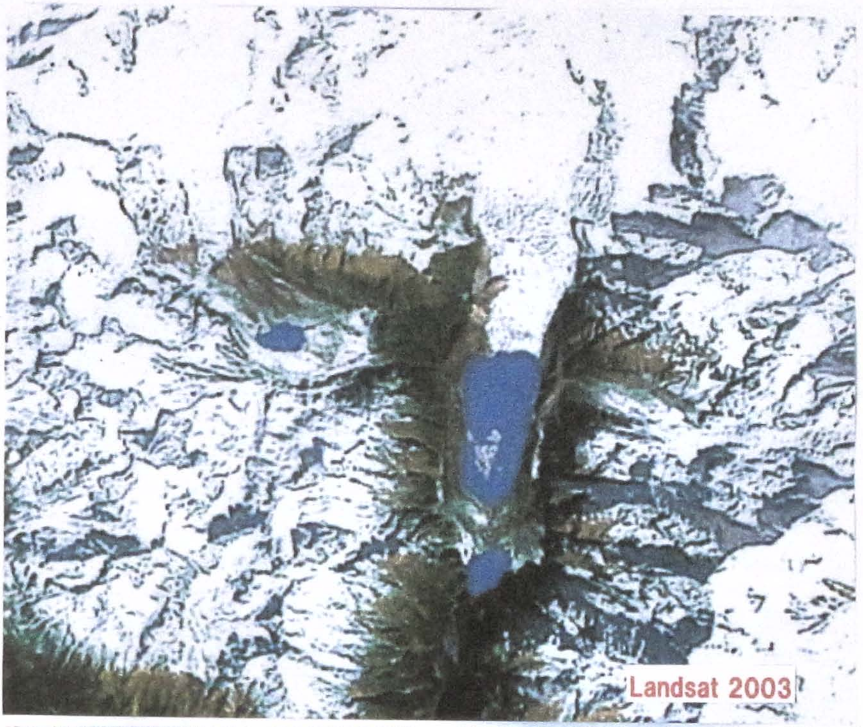
Mark Richey's climbing route in 2006

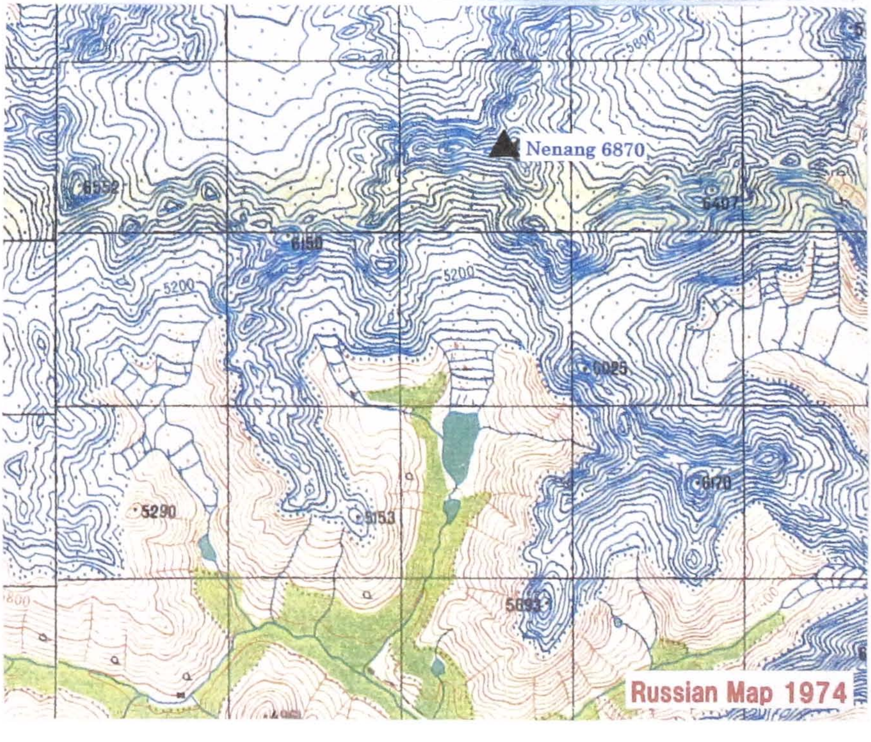


Glacier and glacier lake

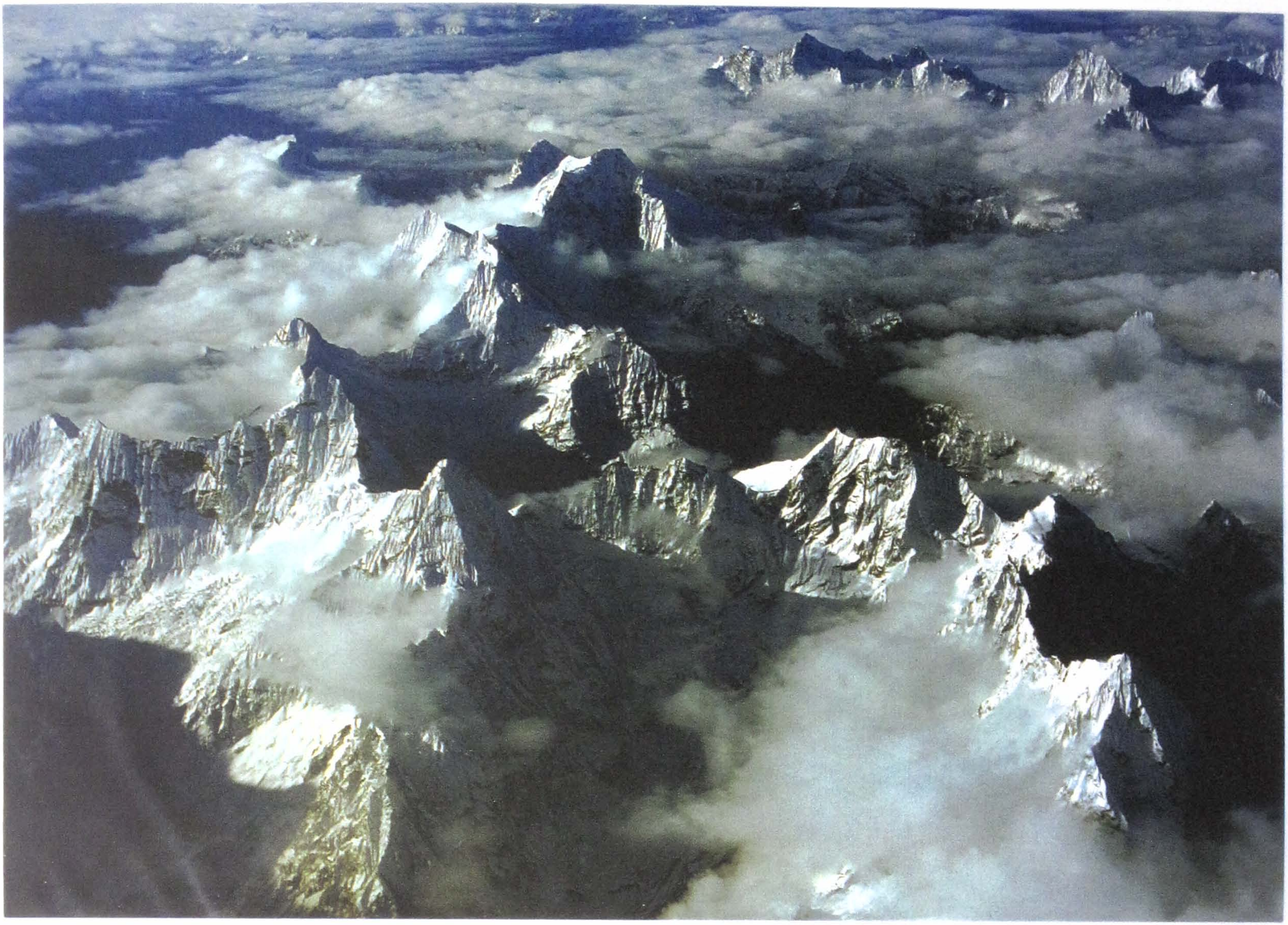
2002

No eminent retreat of the glacier is seen during 30 years.

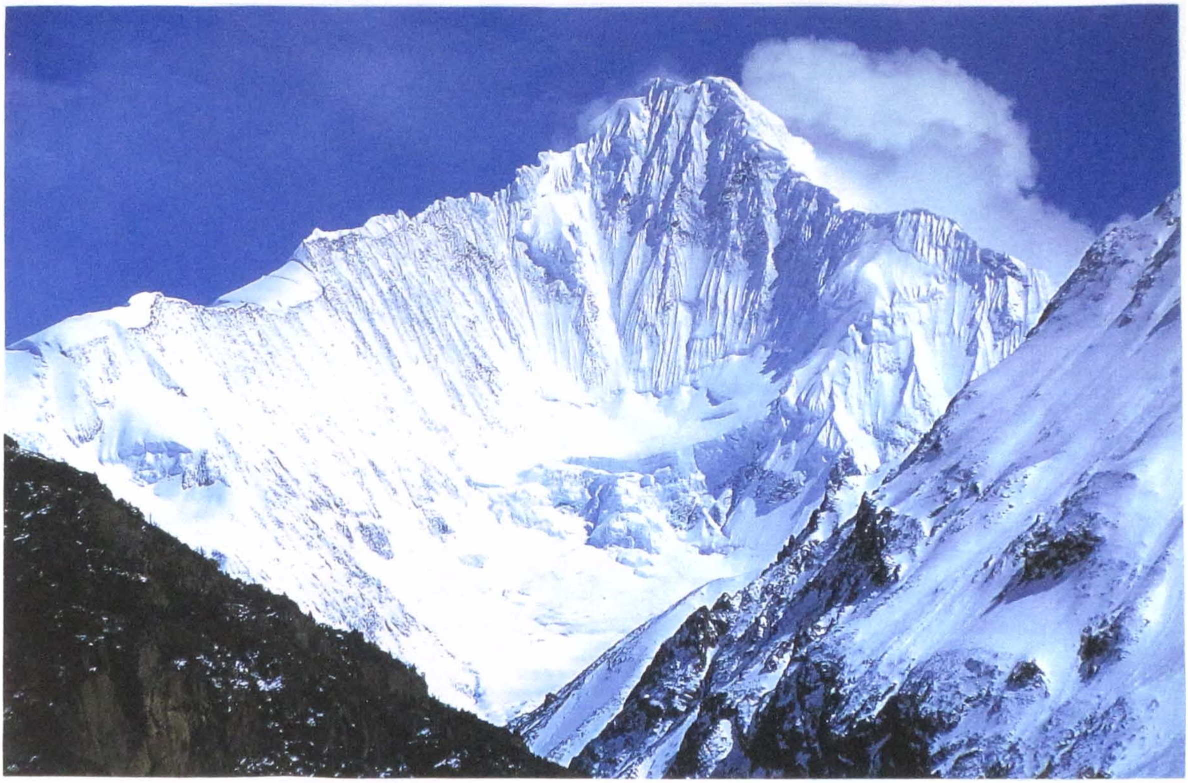

Landsat 2003


Russian Map 1974

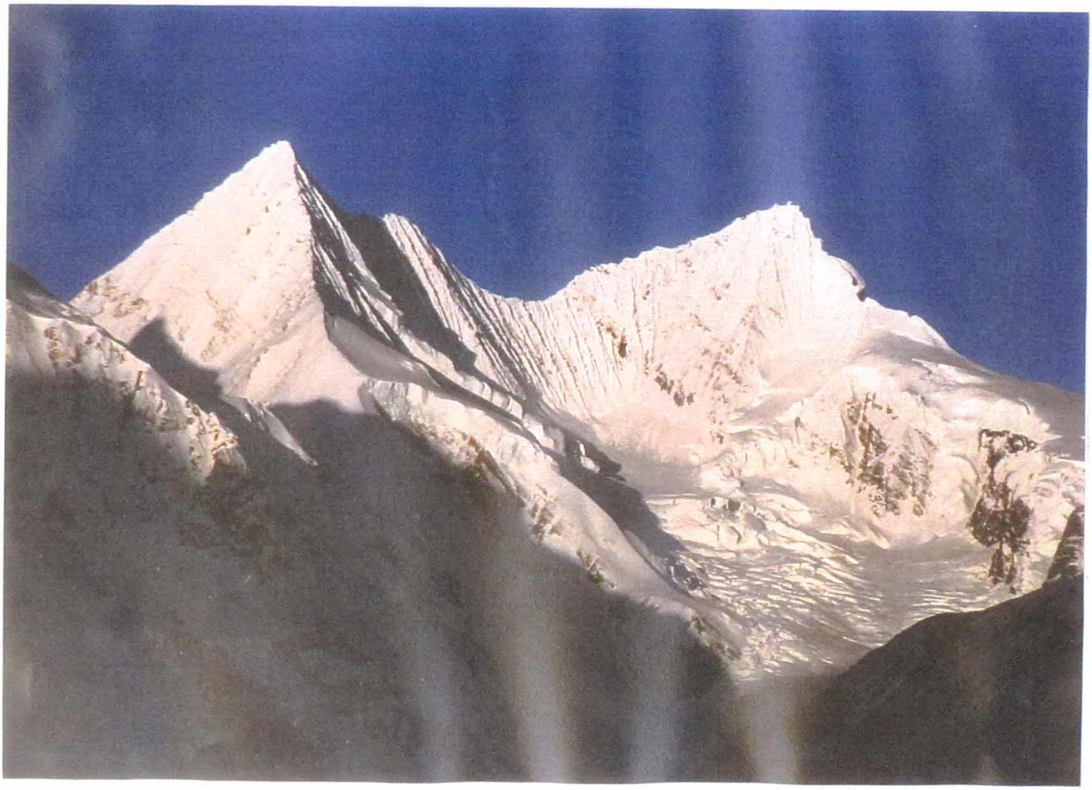
An aerial view of Nyainqentanglha East from an airplane Lhasa – Chengdu



Magnificent Kongga 6488m, North face, in the headwaters of Puyu valley



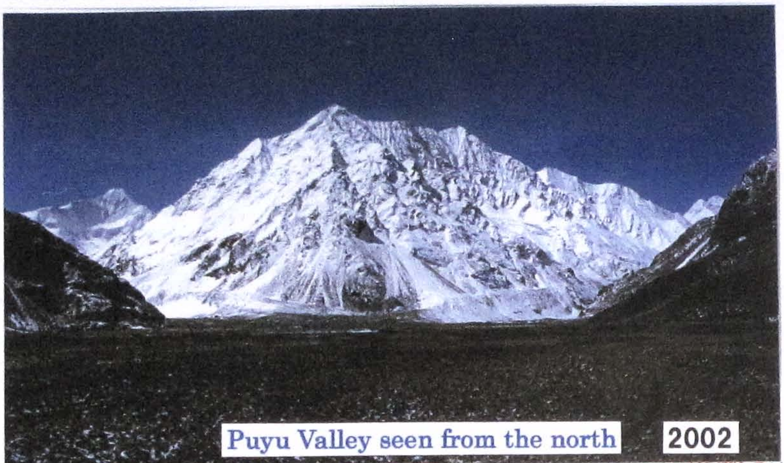
Kona I 6378m (right) & II 6334m (left), view from Puyu valley to southwest



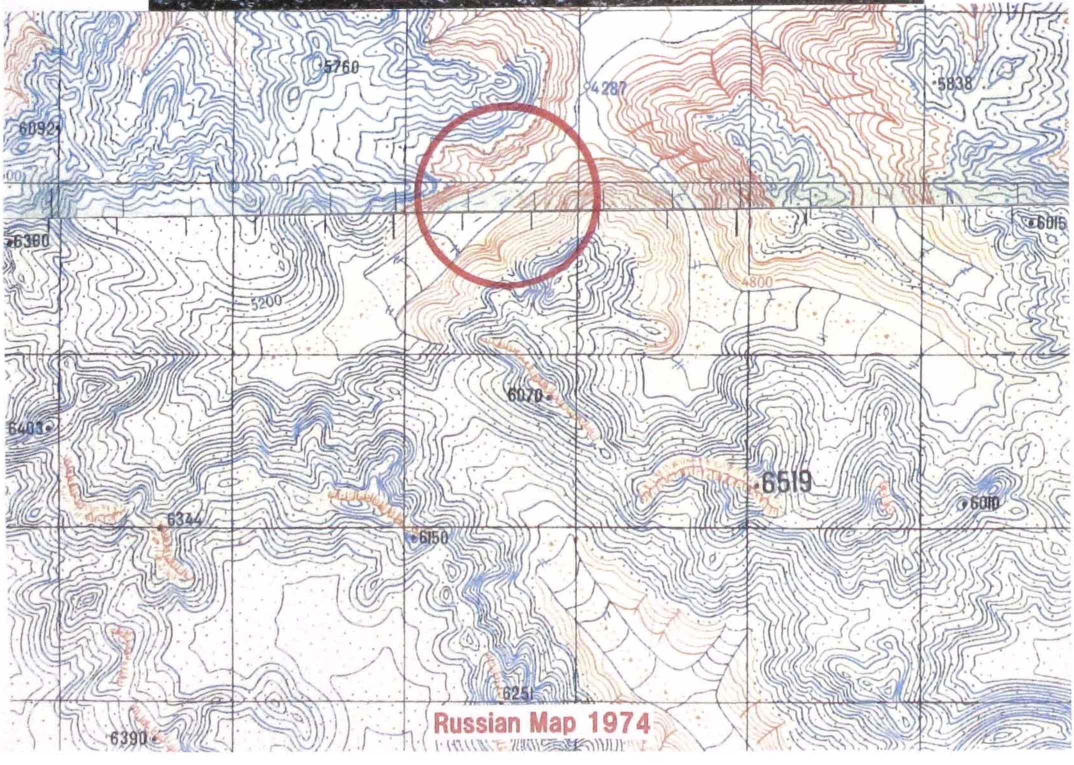
Glaciers in the headwaters of Puyu Valley

- Nyainqentanglha East -

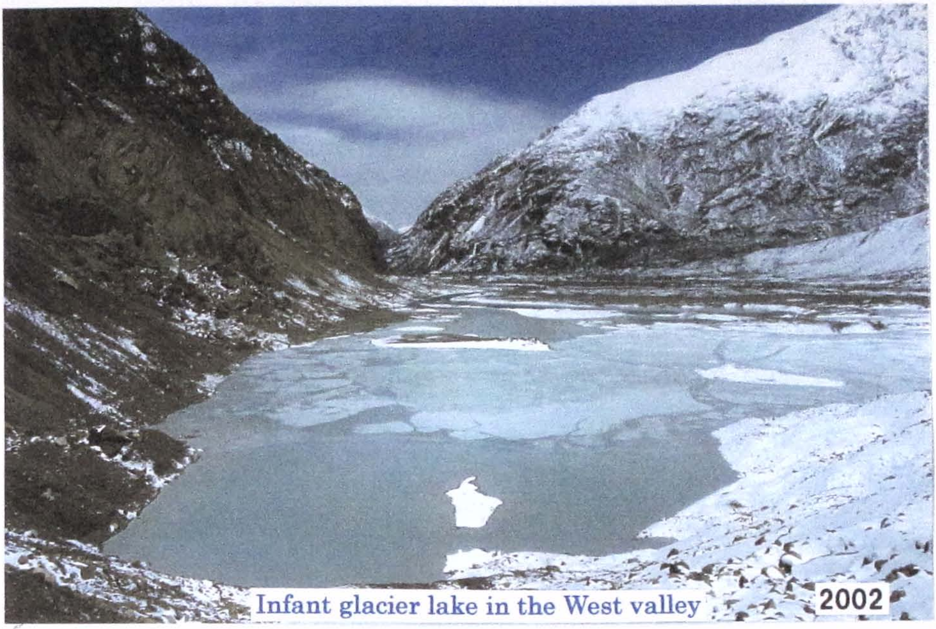
Glaciers in both west and east valleys retreated by 1km in 30 years. An infant lake is created in the west valley, but no glacier was born in the east valley.



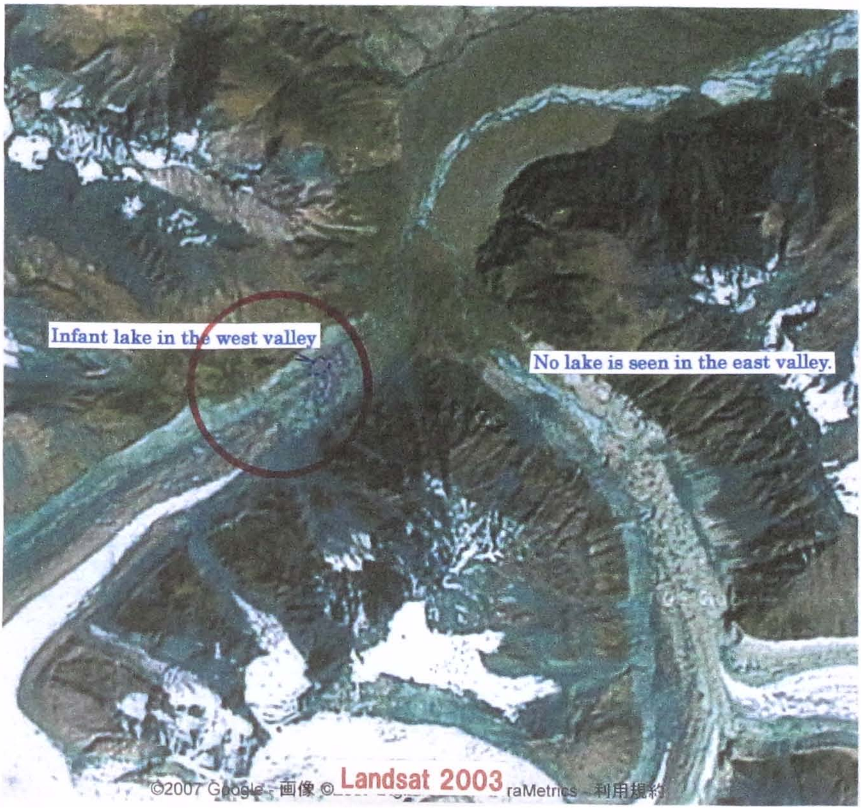
Puyu Valley seen from the north 2002



Russian Map 1974



Infant glacier lake in the West valley
2002



Infant lake in the west valley
No lake is seen in the east valley.
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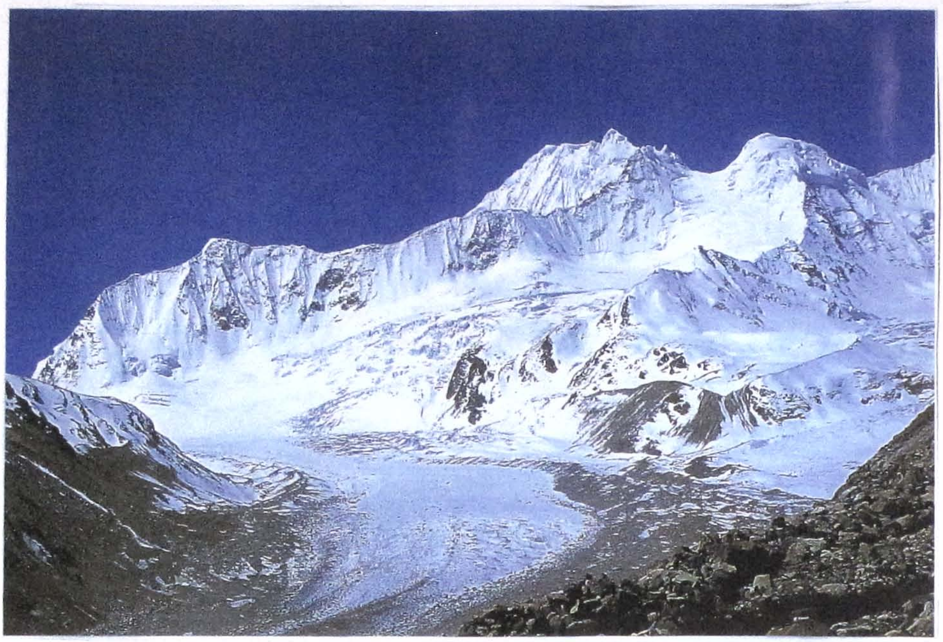
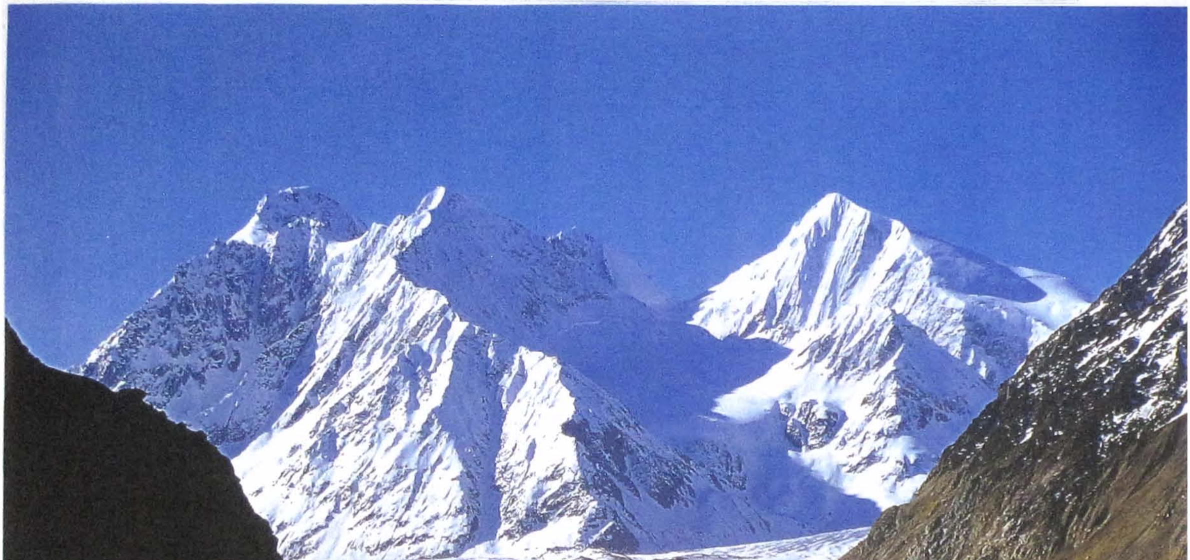
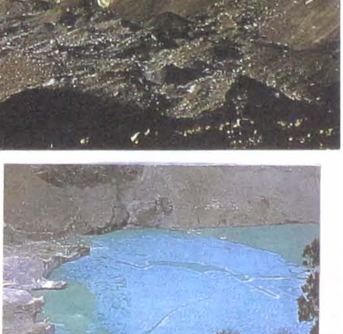
raMetrics - 利用規約
Landsat 2003

Chung Jung Tso 6204m, East face, in the headwaters of Dam Doll valley



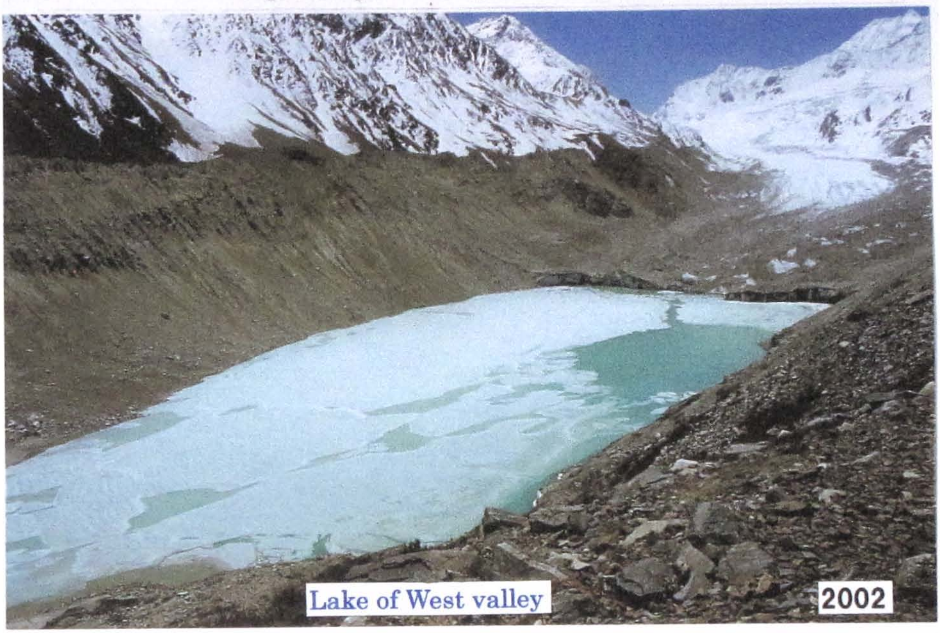
Goyon I 6252m (left) and II 6140m (right), N face, in the headwaters of Dam Doll valley





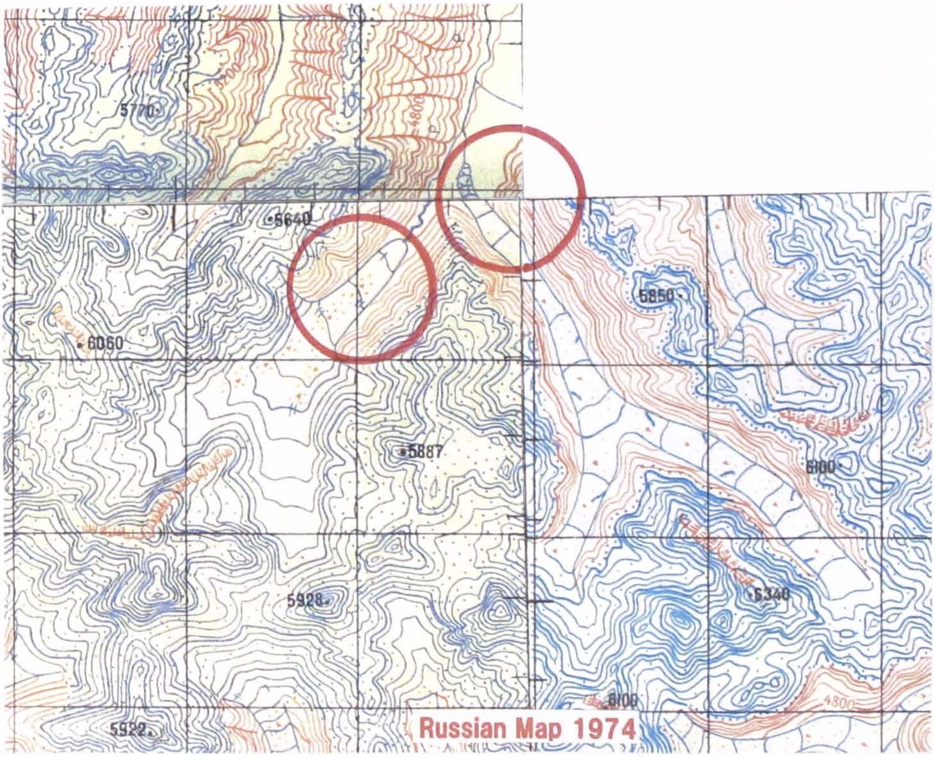
Glaciers in the headwaters of Dam Dol Valley

- Nyainqentanglha East -



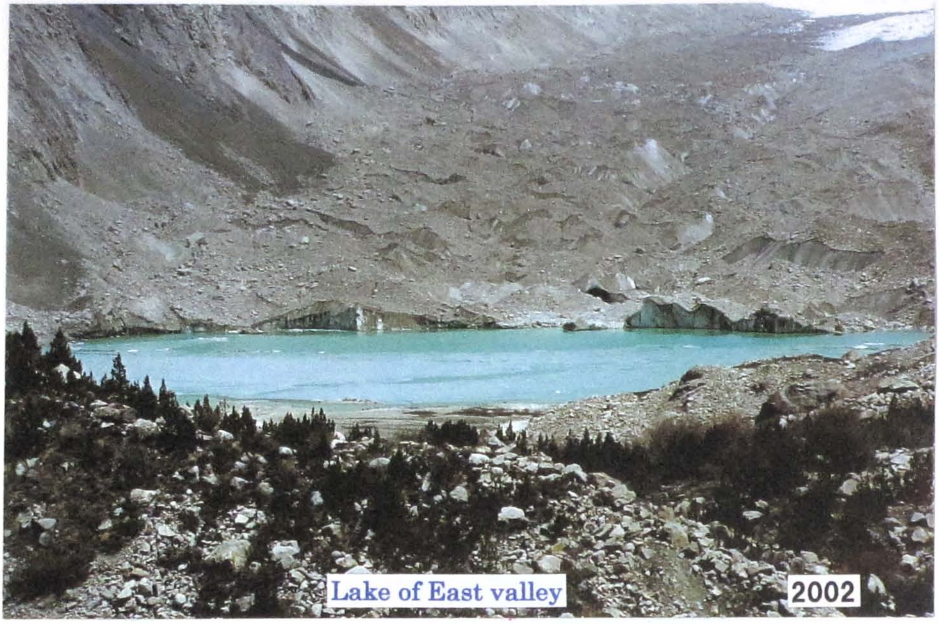
Lake of West valley

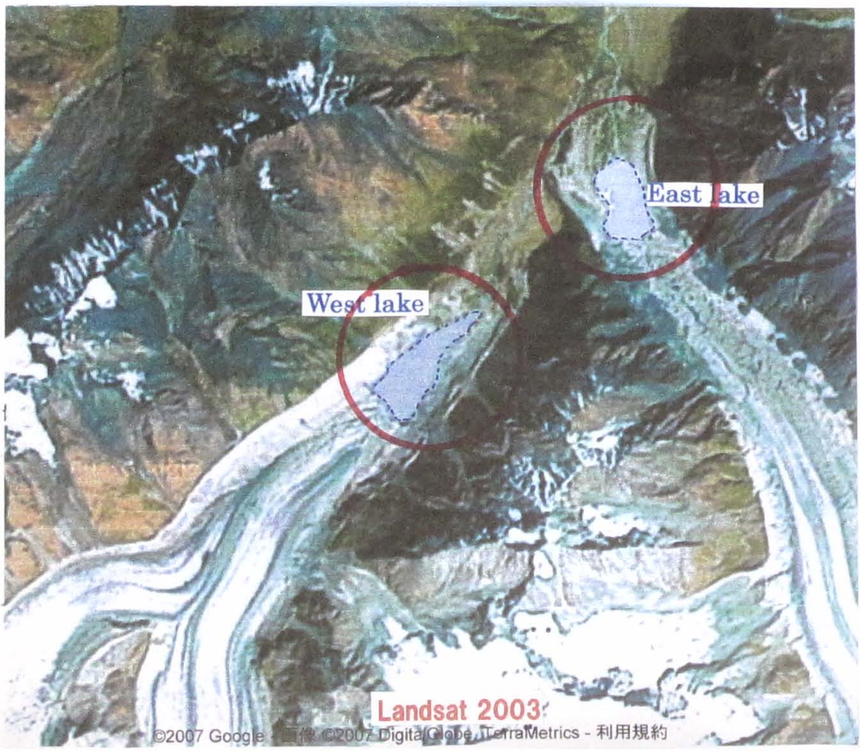
2002



Russian Map 1974

Glaciers retreated by 1.0km in 30 years and new lakes have been created. Russian map of 1974 shows no glacier lakes, but Landsat image of 2003 shows new glacier lakes in the both valleys to the west and east.




East lake
West lake
Landsat 2003
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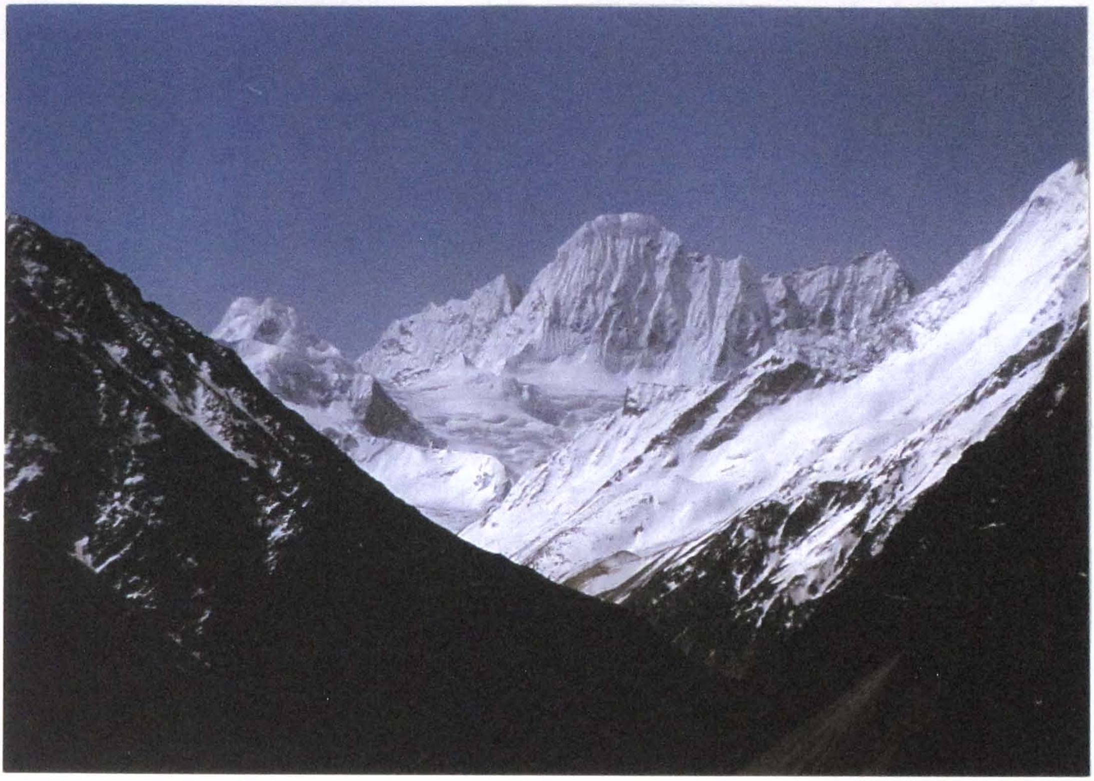
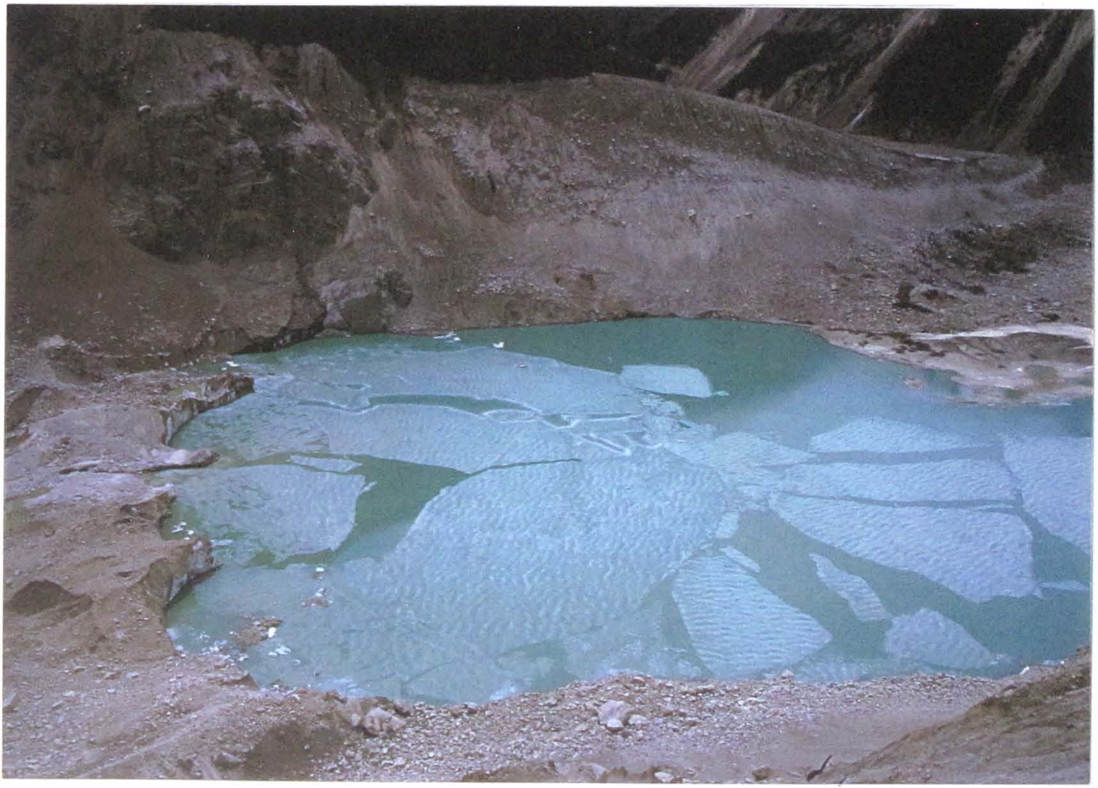
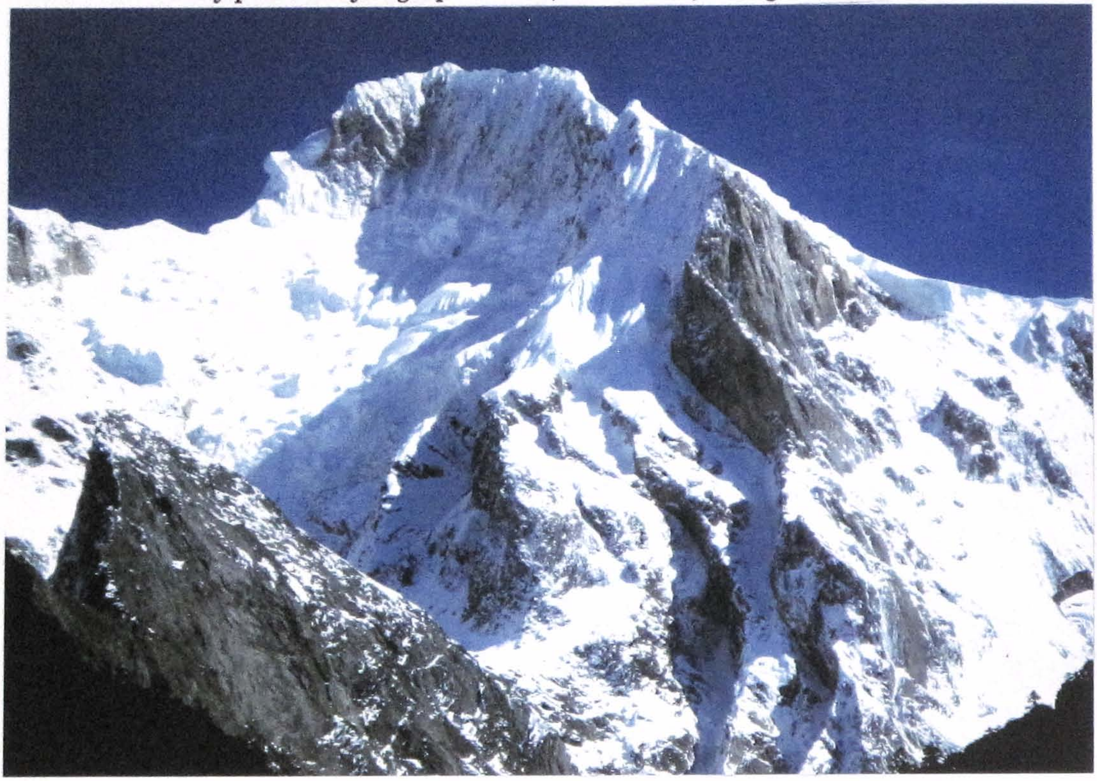
ダム・ドル谷—無名峰 6156m、北面　Nameless Pk 6156m, view from Dam Dol



ダム・ドル谷の源頭—生成中の氷河湖　Infant glacier lake in Dam Dol vally



Holy peak - Hayungarpo 6388m, North face, Yi'ong Tsangpo

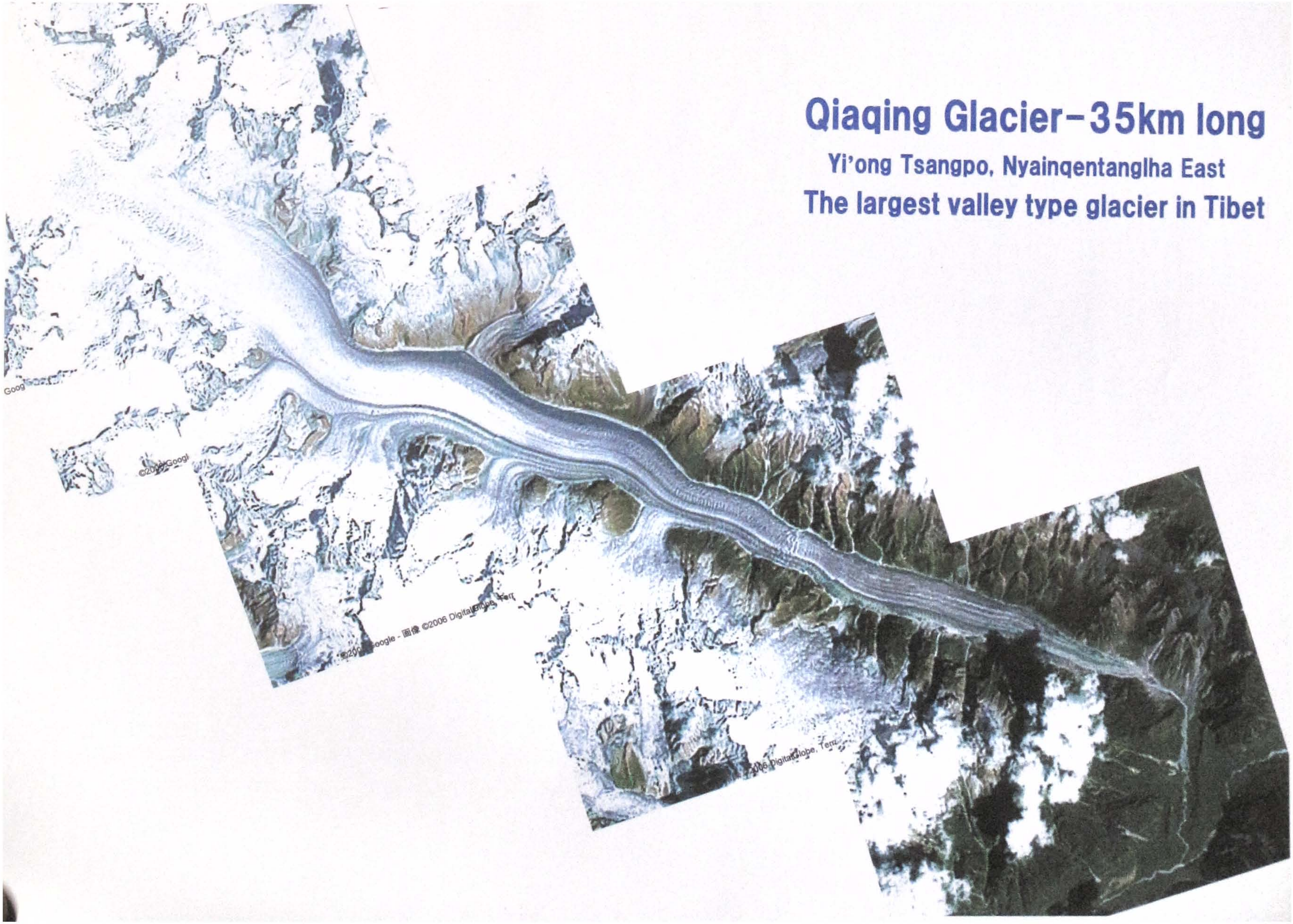


Holy peak - Hayungarpo 6388m, South face, Yi'ong Tsangpo

Qiaqing Glacier－35km long

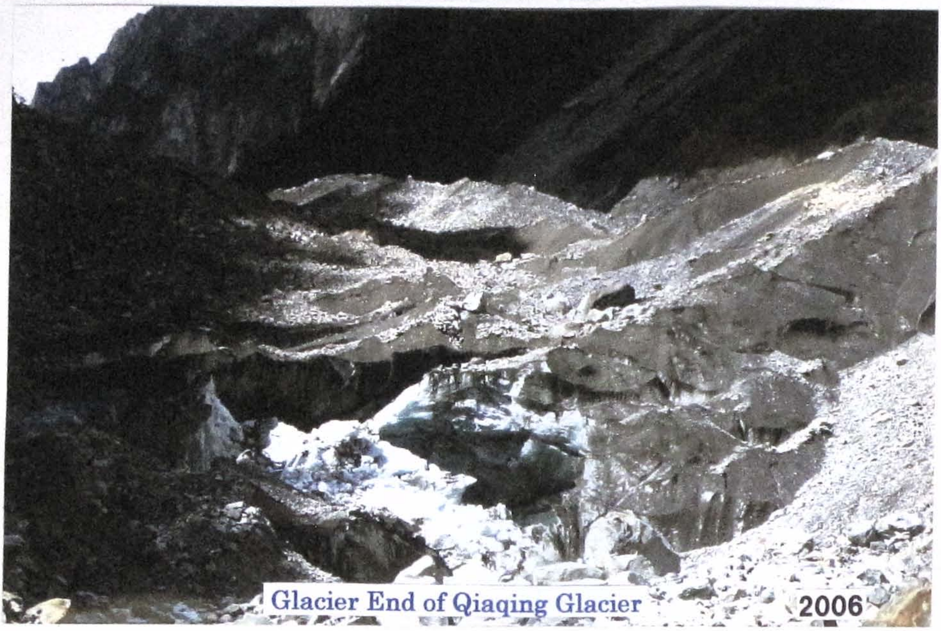
Yi'ong Tsangpo, Nyainqentanglha East

The largest valley type glacier in Tibet

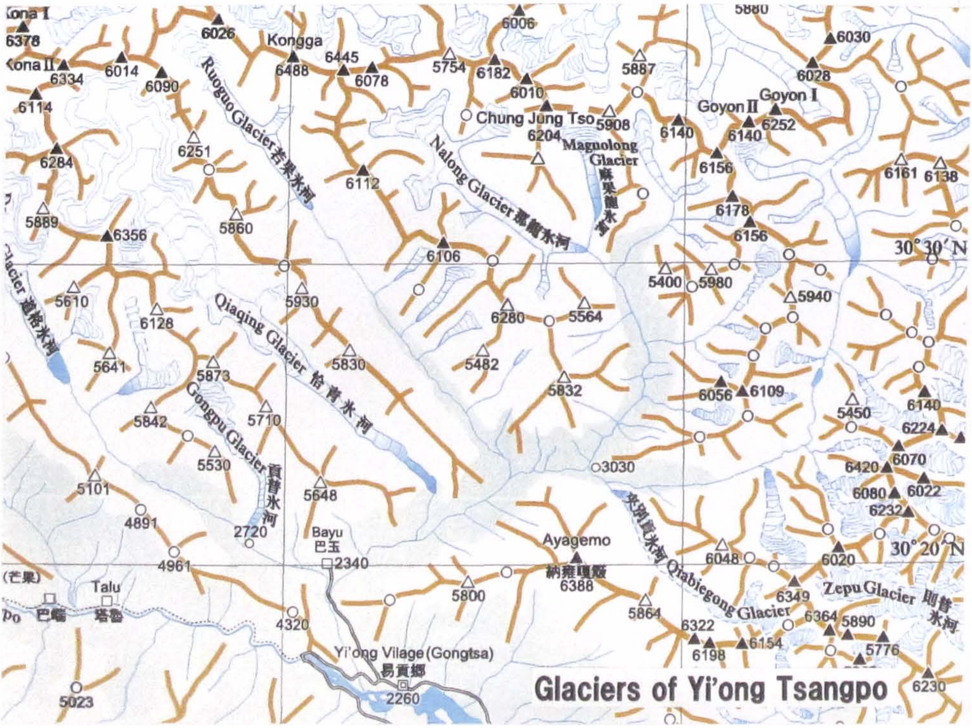


Qiaqing Glacier in Nye Qu of Yi'ong Tsangpo

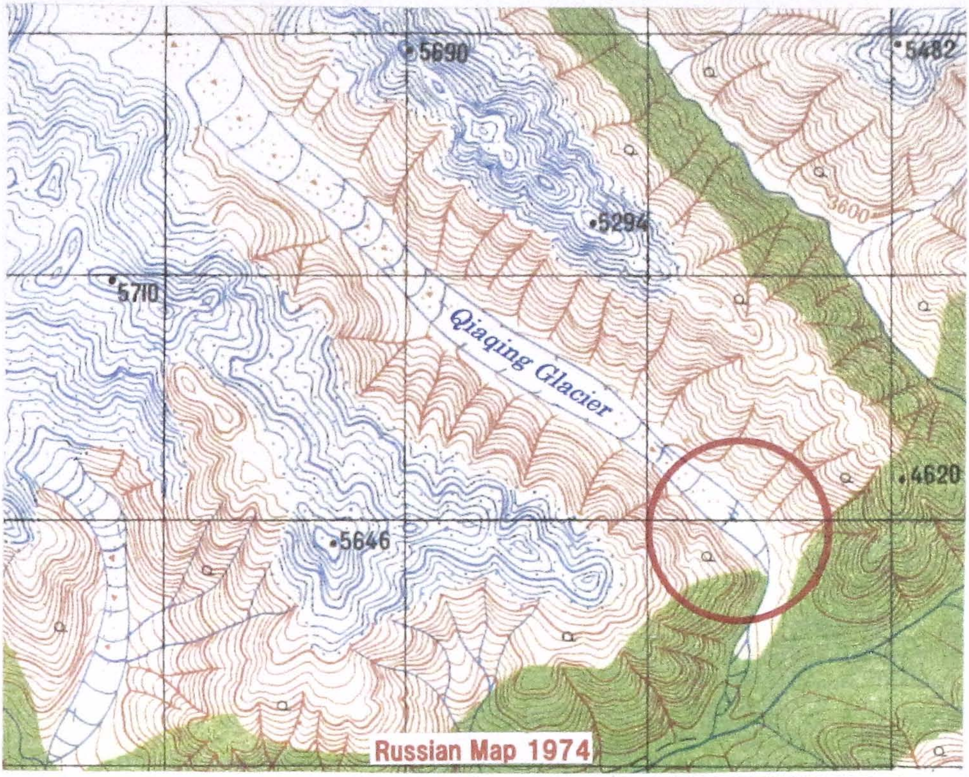
- Nyaiqentanglha East -



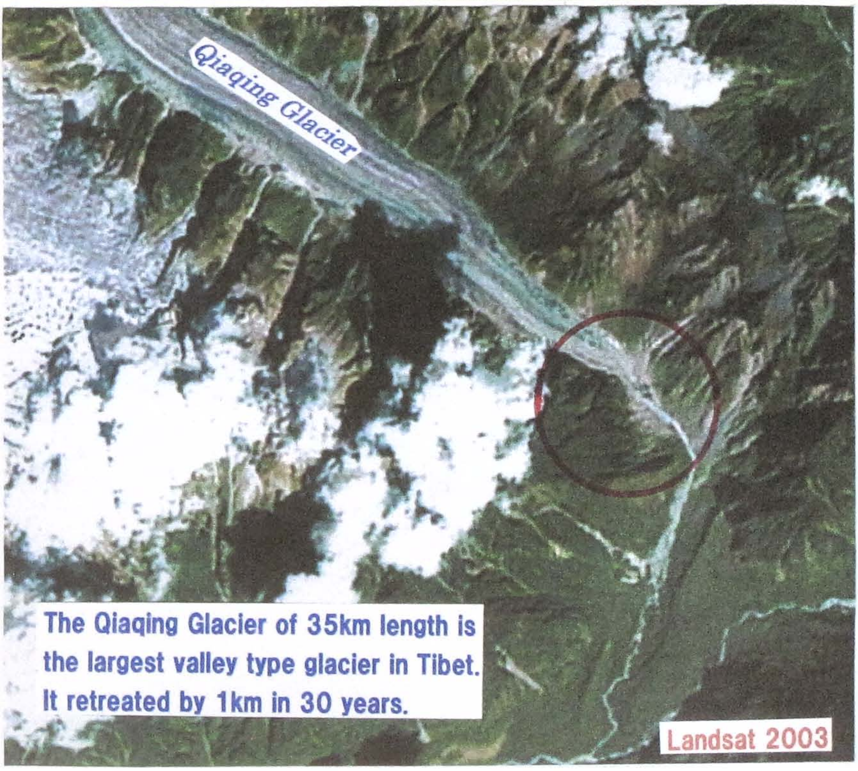
Glacier End of Qiaqing Glacier 2006



Glaciers of Yi'ong Tsangpo



Russian Map 1974



The Qiaqing Glacier of 35km length is the largest valley type glacier in Tibet. It retreated by 1km in 30 years.

Landsat 2003

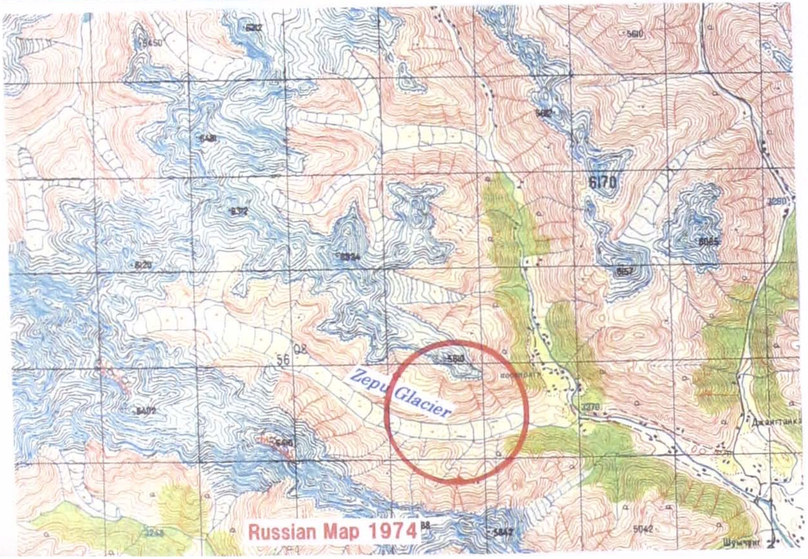
Zepu Glacier in Botoi Tsangpo north of Bomi

- Nyaiqentanglha East -

Comparison of Russsian map and Landsat image indicates no eminent retreat in 30 years

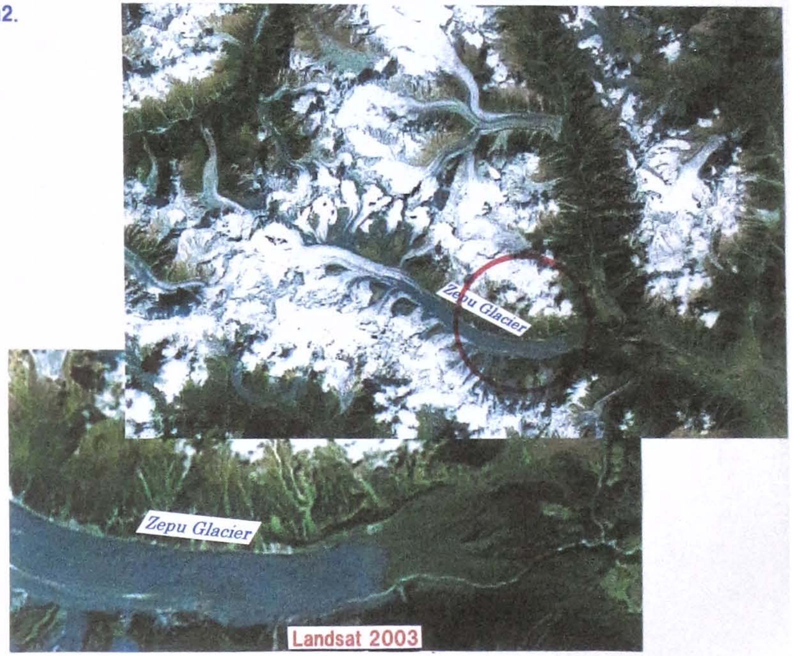
Glacier end of Zepu Glacier **2006**

A team of the Chinese Academy of Sciences which conducted field research of the Zepu Glacier in 1989 mentioned that no systematic survey had been made in Nyainqentanglha East mountain range----the observations on Zepu Glacier were limited in several days late September. The glacier is 19m long and extends from 6350m to 3420m from west to east – southeast in an area of 66km2.



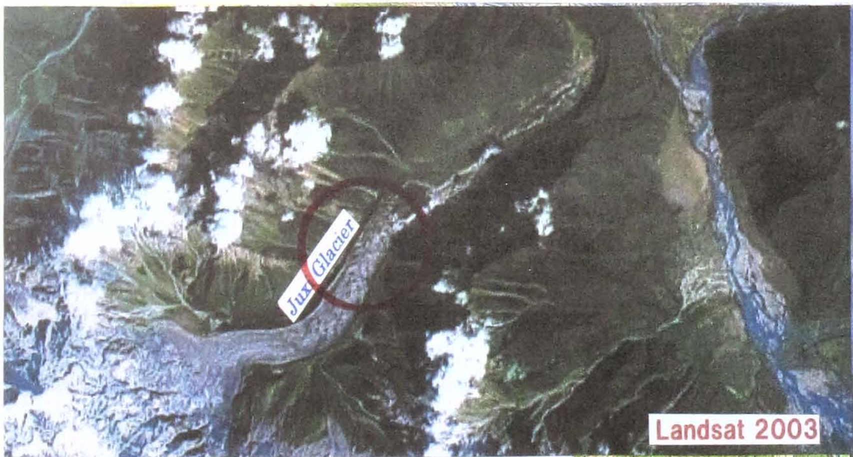
Russian Map 1974

6300m peaks surrounding Zepu Glaccier **2006**

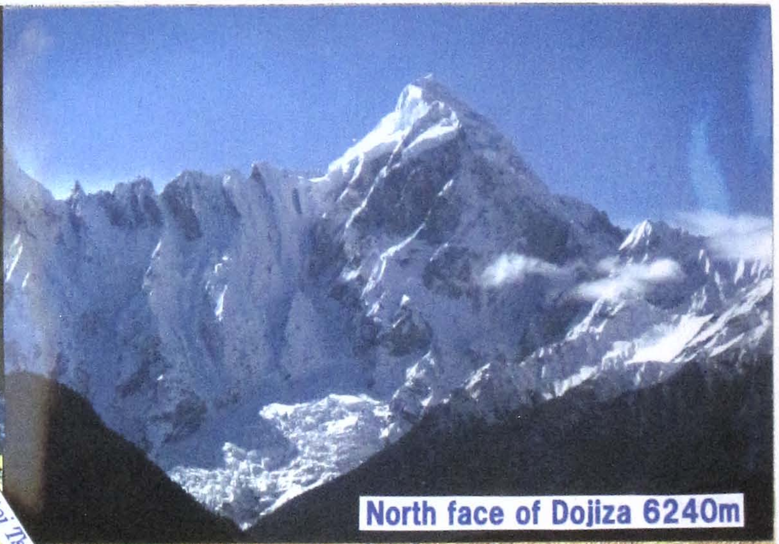


Landsat 2003

Juxi Glacier of Dojiza 6240m, Botoi Tsangpo - Nyaiqentanglha East

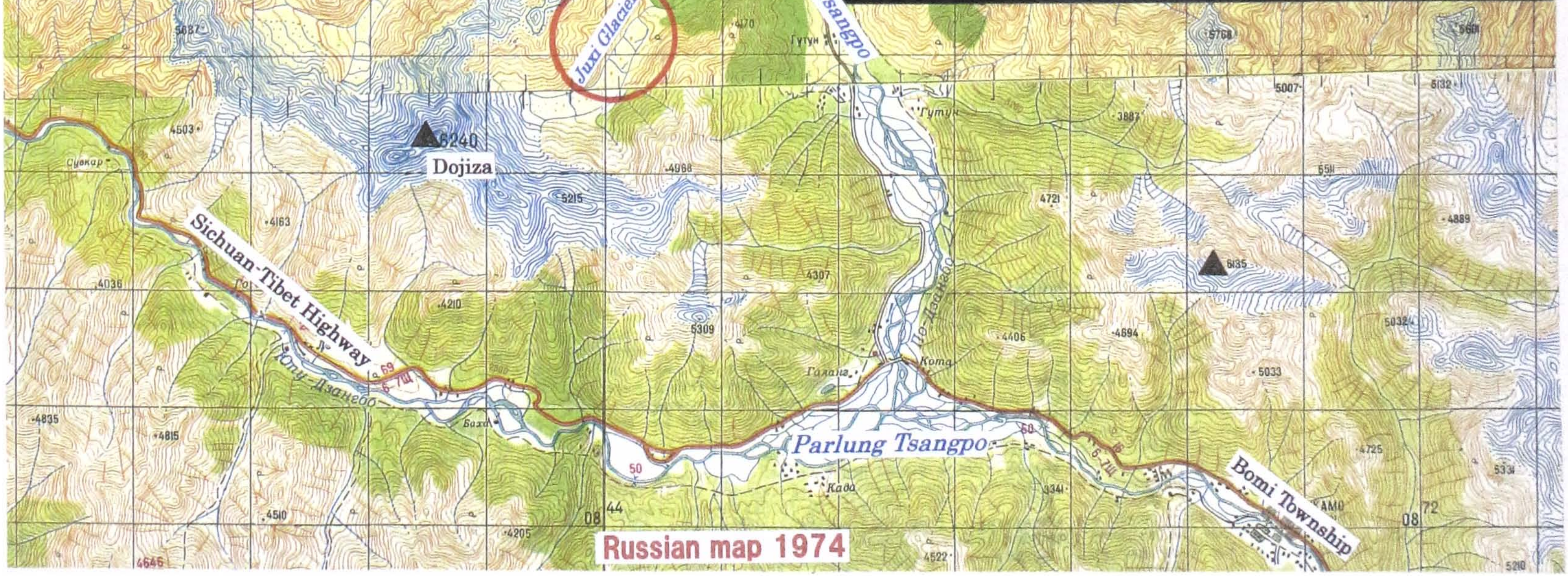


Landsat 2003



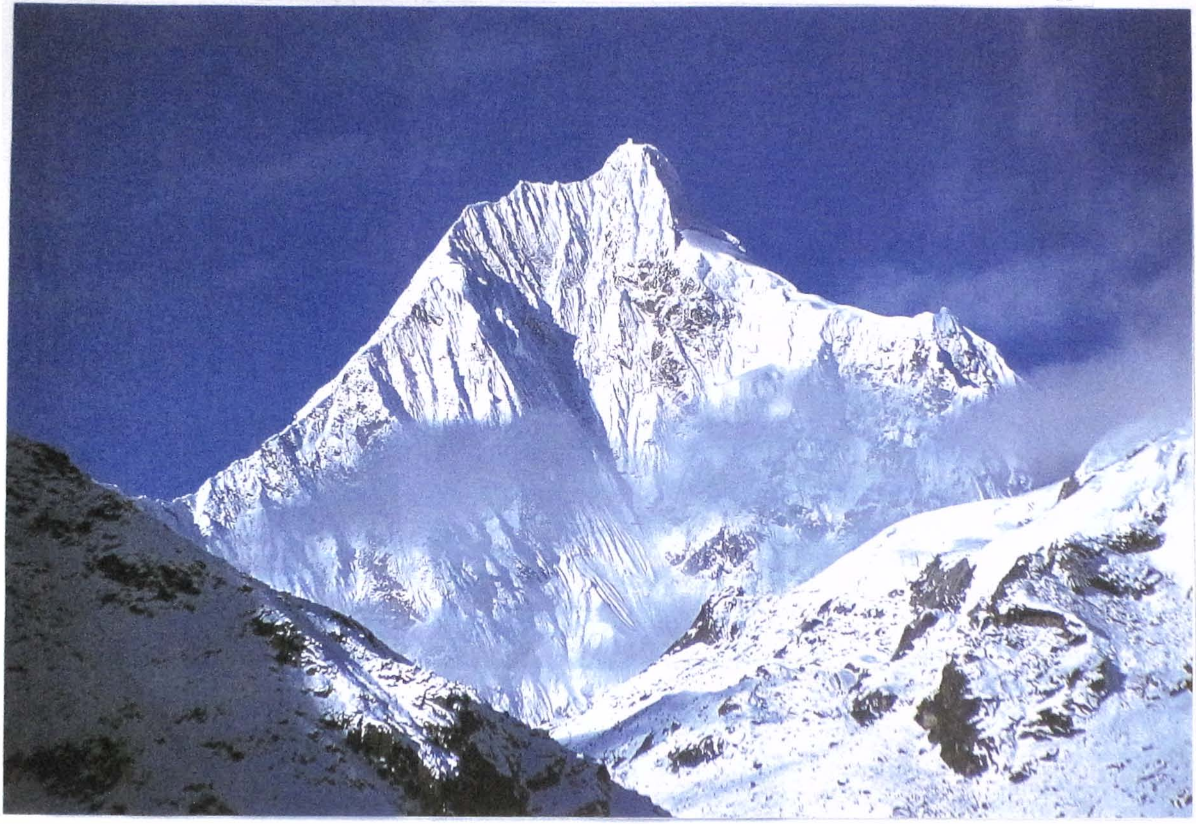
North face of Dojiza 6240m

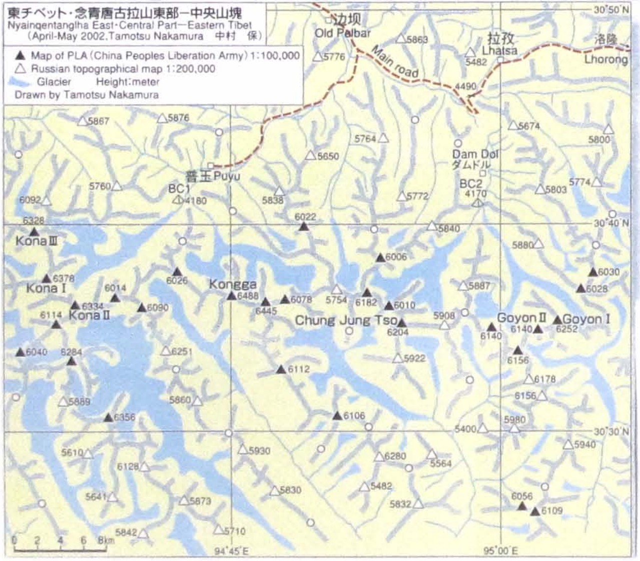
Glacier terminus of Juxi Glacier is debri-mantled.
No eminent retreat is observed.

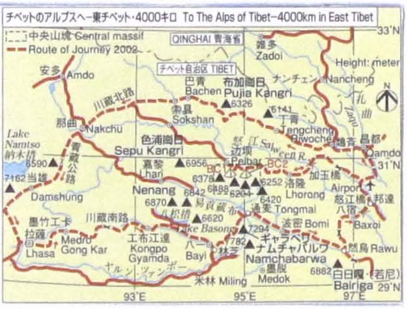


Russian map 1974

Jalong I 6292m, East face, a view from Jalong Glacier end, Zepu Qu, Botoi Tsangpo



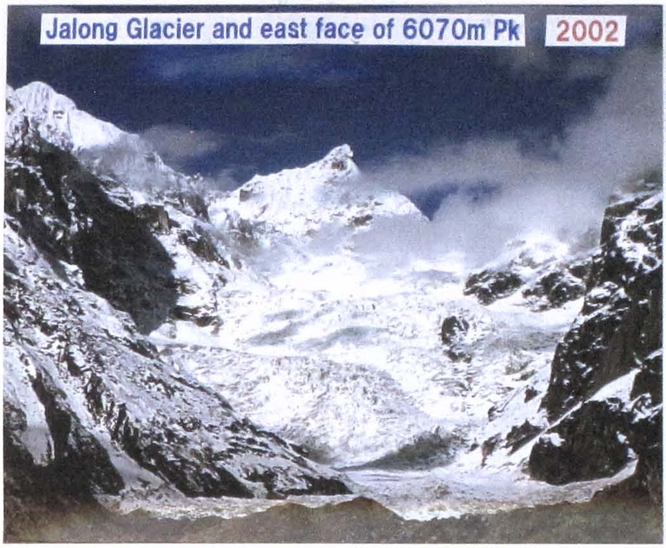

東チベット・念青唐古拉山東部ー中央山塊
Nyainqentanglha East・Central Part—Eastern Tibet
（April-May 2002,Tamotsu Nakamura　中村　保）
▲ Map of PLA（China Peoples Liberation Army）1:100,000
△ Russian topographical map 1:200,000
Glacier　Height:meter
Drawn by Tamotsu Nakamura
边坝 Old Pelbar
拉孜 Lhatsa
洛隆 Lhorong
Main road
普玉 Puyu
BC1
Dam Dol ダムドル
BC2
Kona III
Kona I
Kona II
Kongga
Chung Jung Tso
Goyon II
Goyon I
30°50'N
30°40'N
30°30'N
94°45'E
95°00'E
0 2 4 6 8km



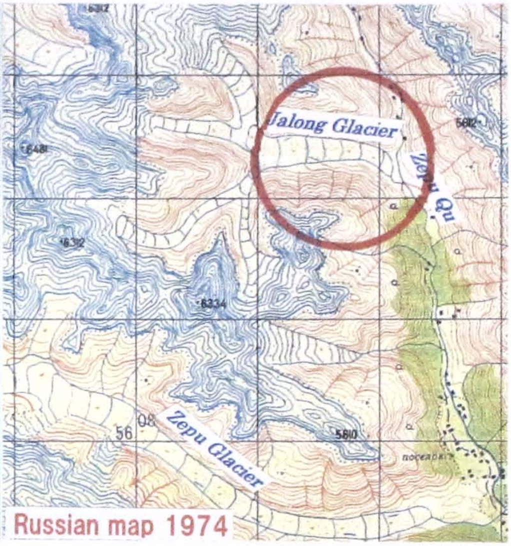
Jalong Glacier of Botoi Tsangpo

- Nyaiqentanglha East-

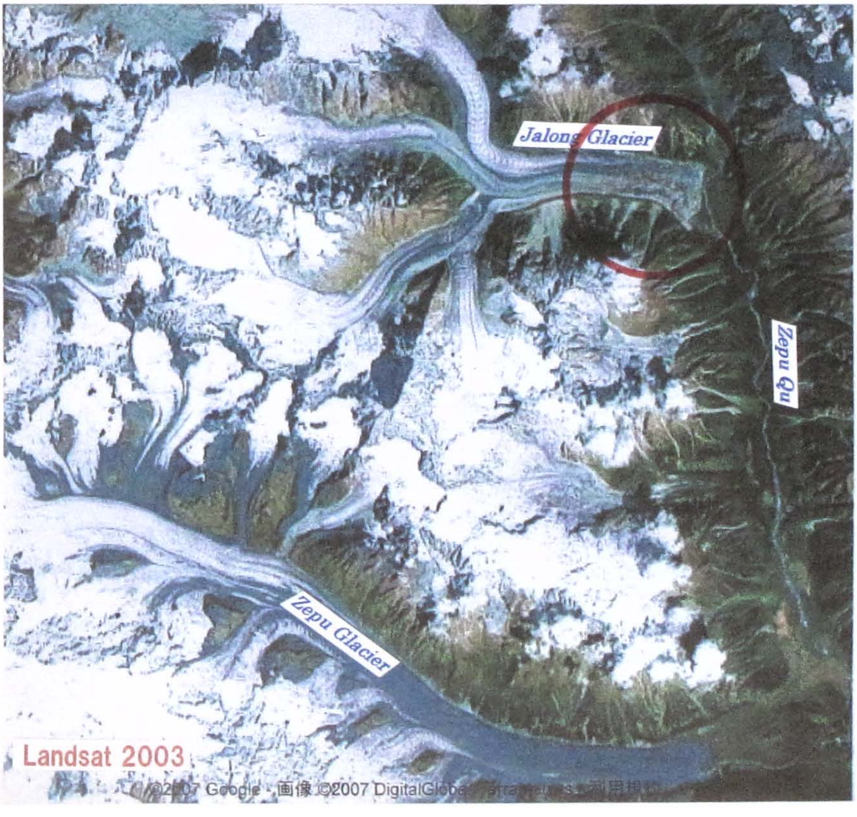
No eminent retreat is seen in 30 years.
Glacier reaches Zepu Qu (river).



Jalong Glacier and east face of 6070m Pk 2002



Russian map 1974



Landsat 2003

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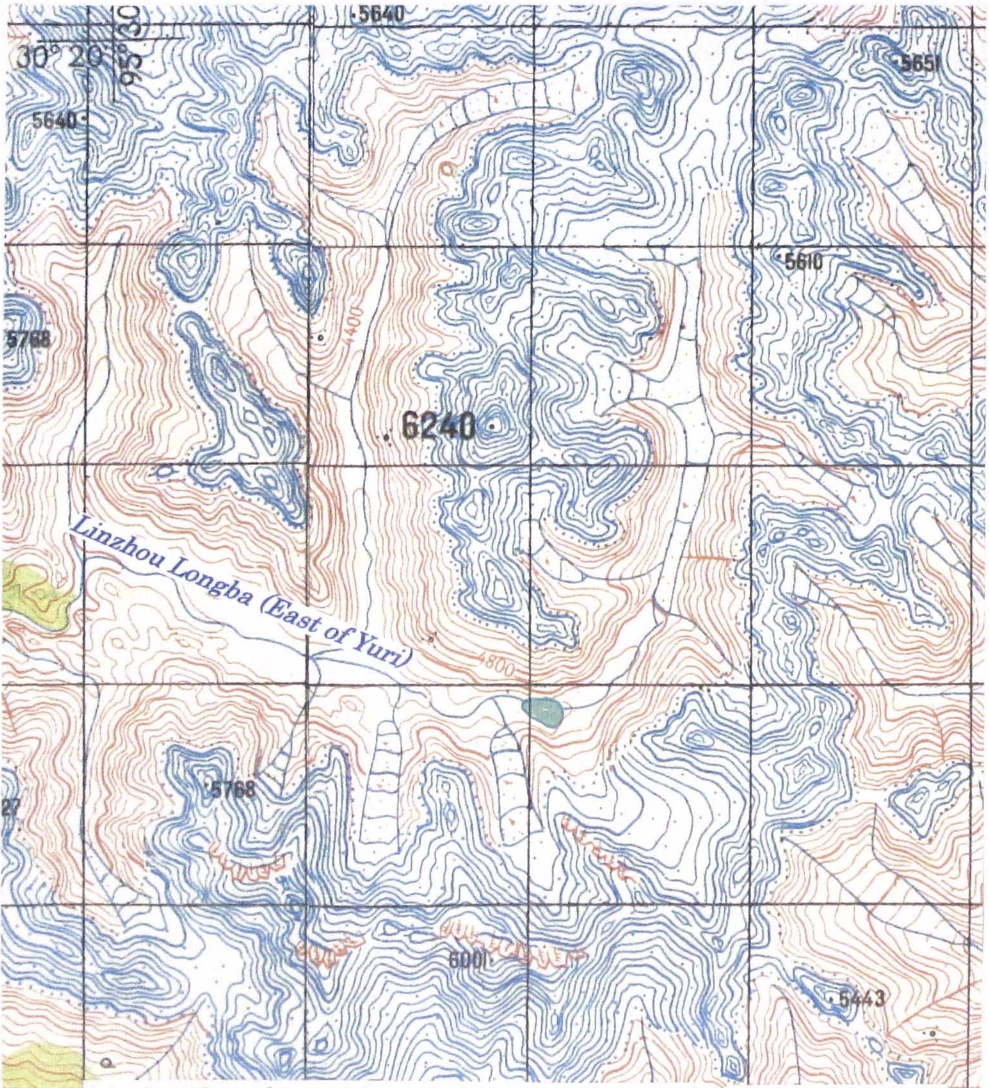
Glaciers & New Glacier Lakes in Botoi Tsangpo

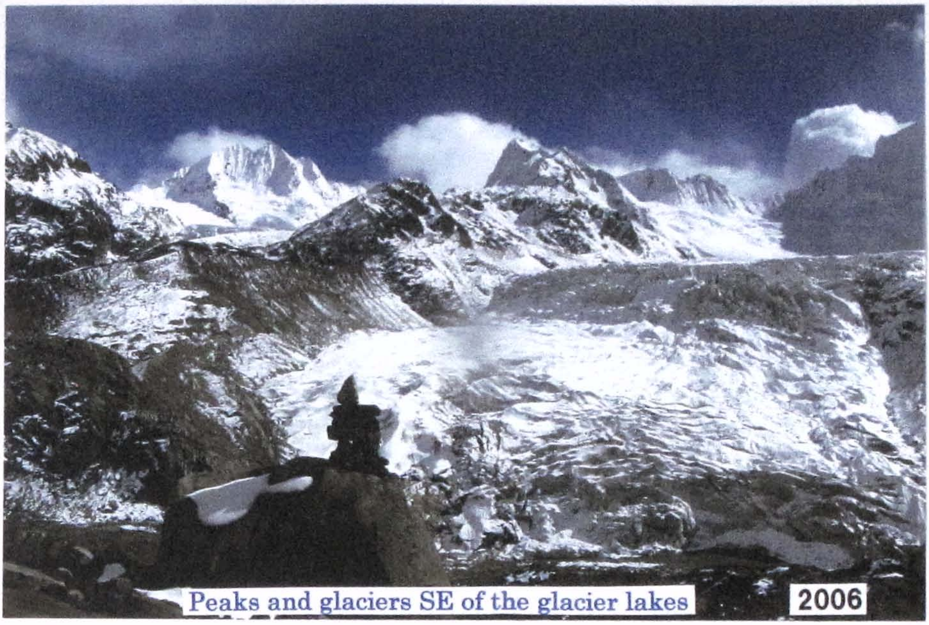
- Nyaiqentanglha East -

Russian map of 1974 does not show glacier lakes except smaller one in the bend of Linzhou Longba (valley east of Yuri village), whilst four new lakes are seen on the image of Landsat 2003. Larger new glacier lakes were created in 30 years.



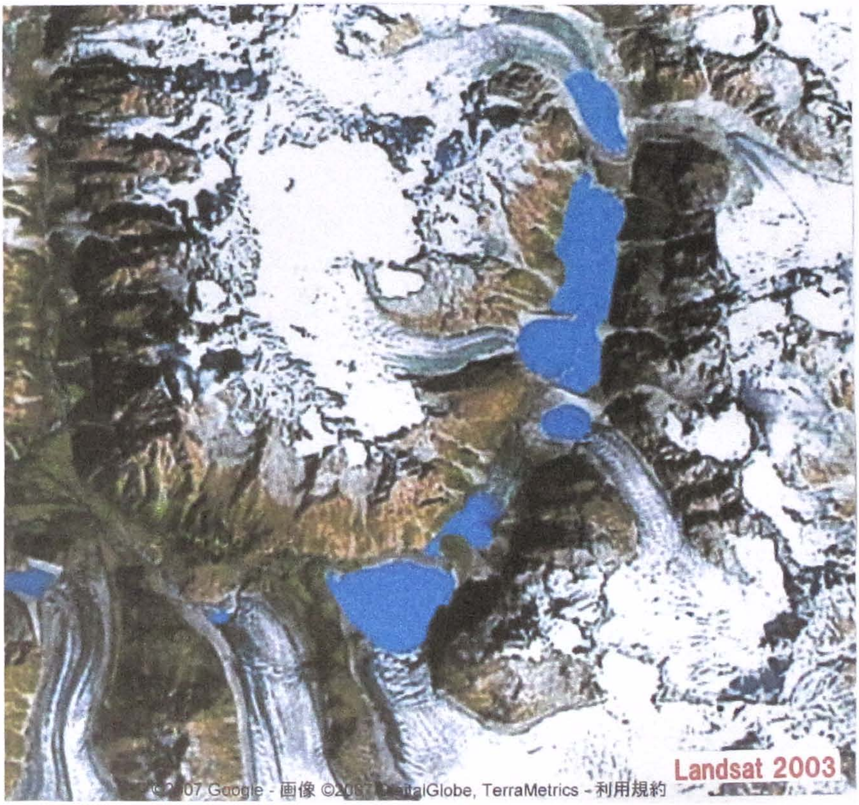
Linzhou Longba, a tributary of Botoi Tsangpo

Russian Map 1974



Peaks and glaciers SE of the glacier lakes

2006



Landsat 2003

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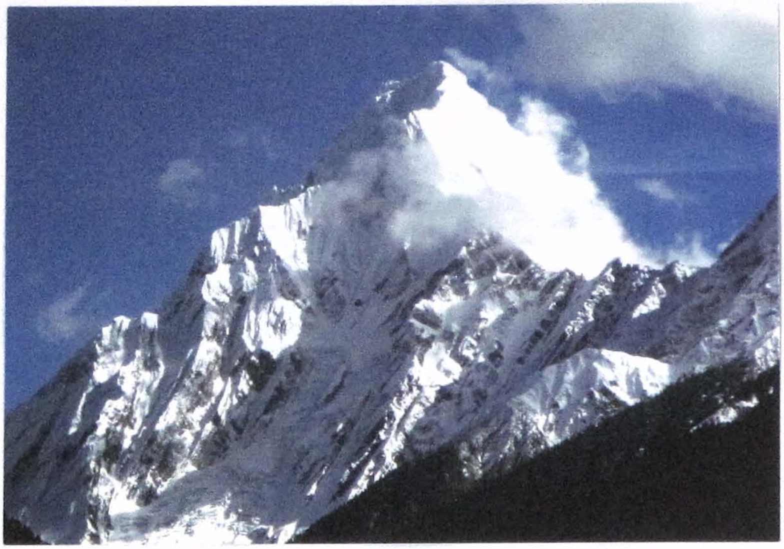
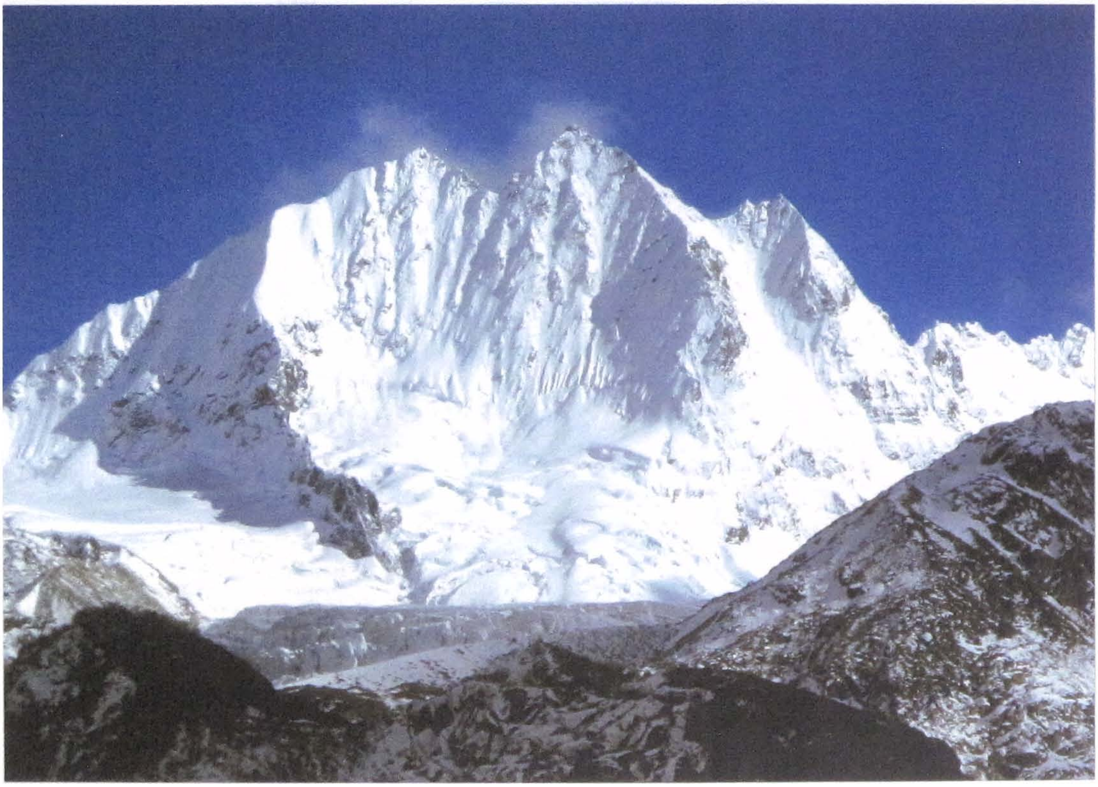
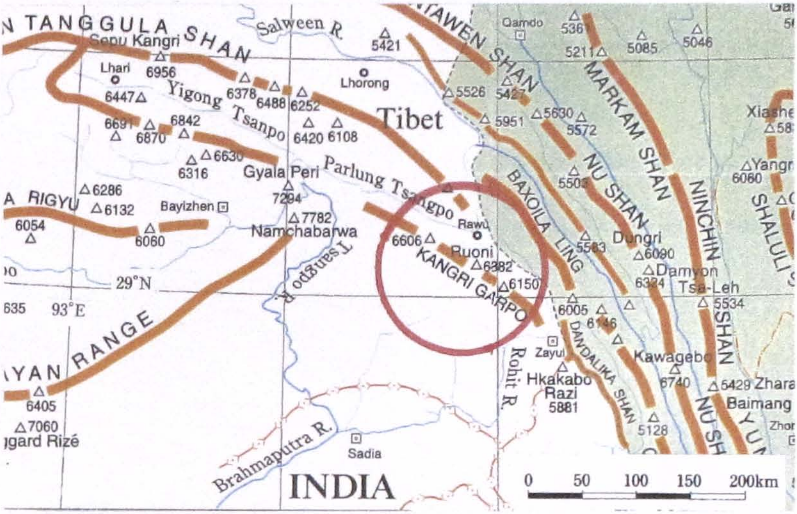
Unnamed 6135m, West face, Botoi Tsangpo

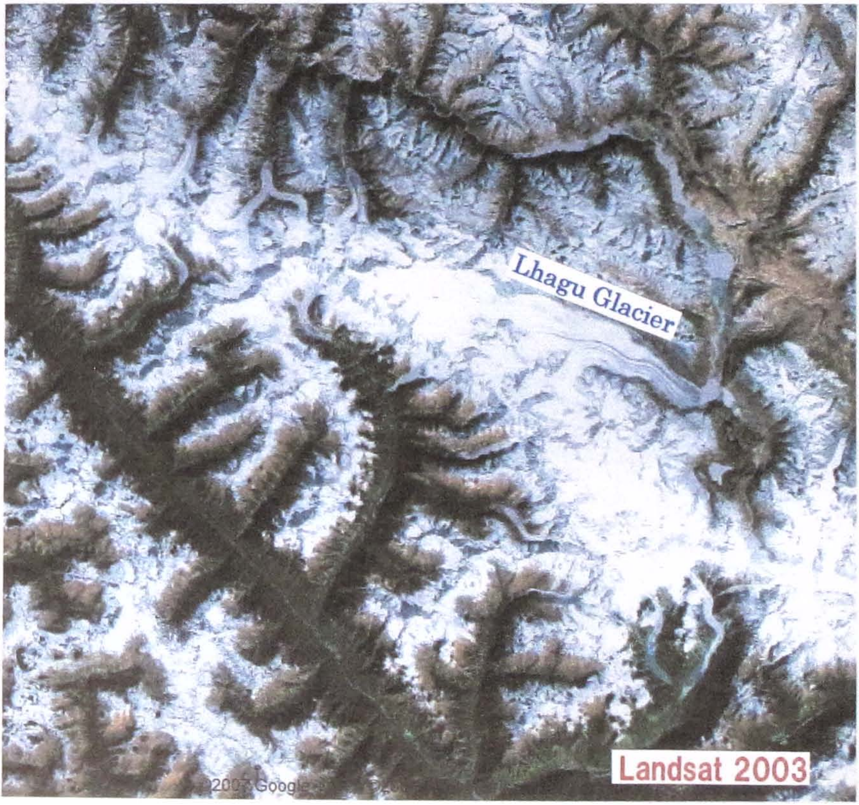


Shining ca. 5800m, West face, Botoi Tsangpo

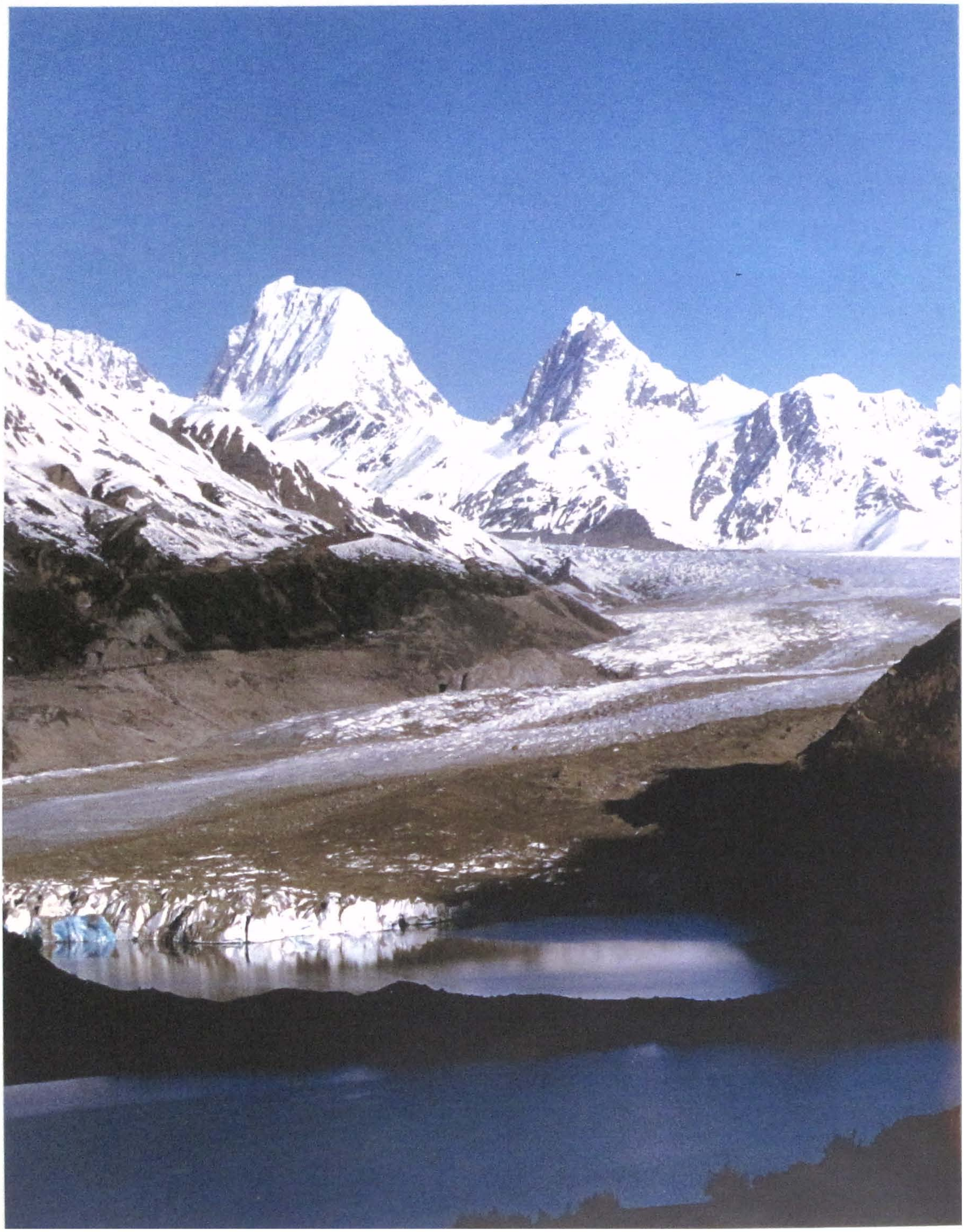


3. East Tibet – Kangri Garpo East

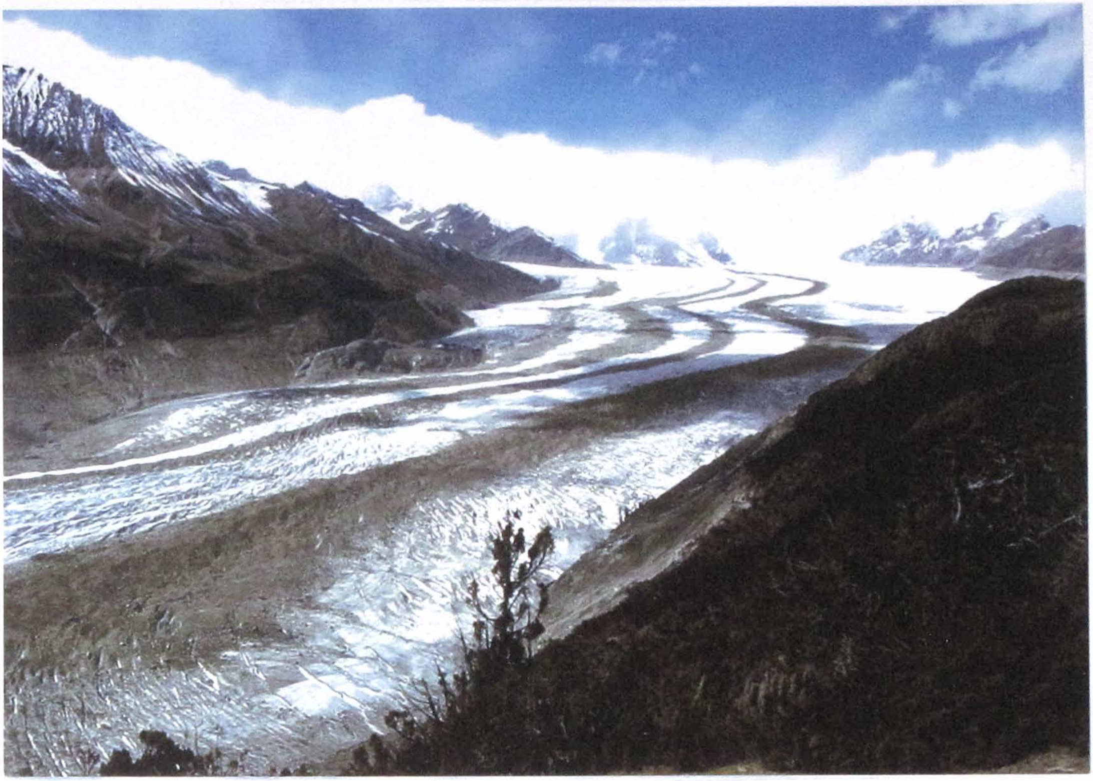




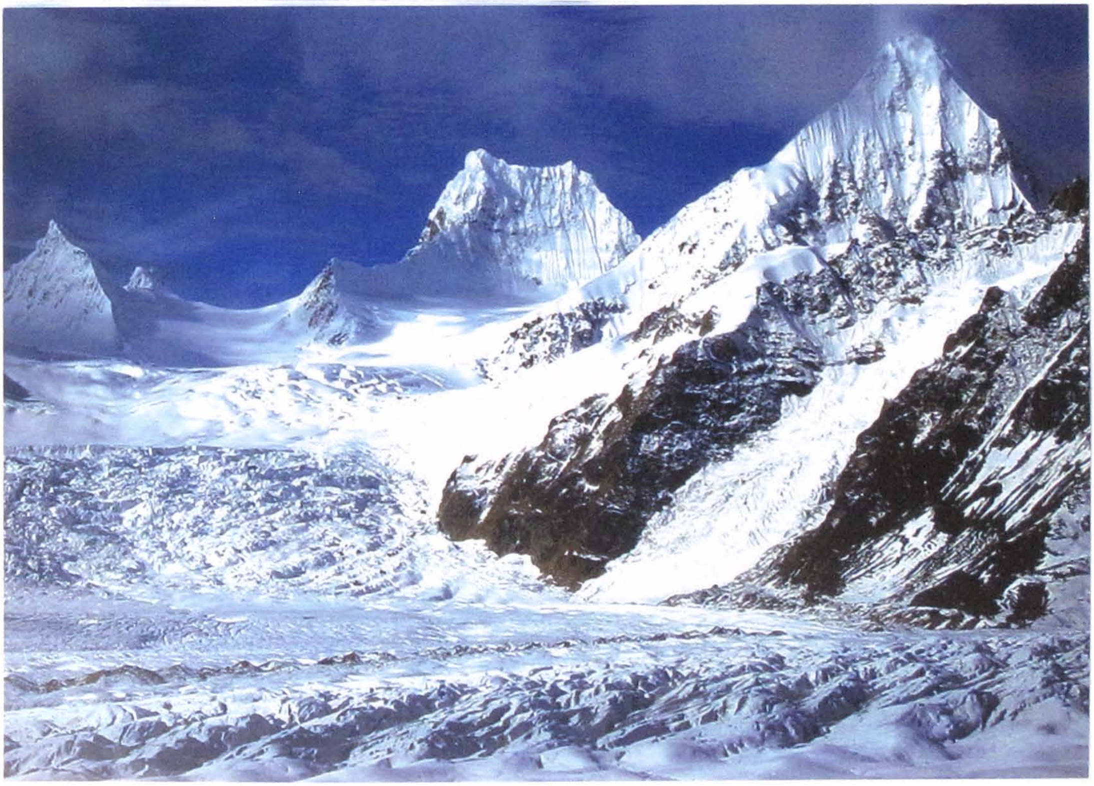
Lhagu Glacier, glacial lakes and Gongyada (Hiqen I) 6423m (left) and Zeh (Hiqen II) 6127m (right), East face, Kangri Garpo East



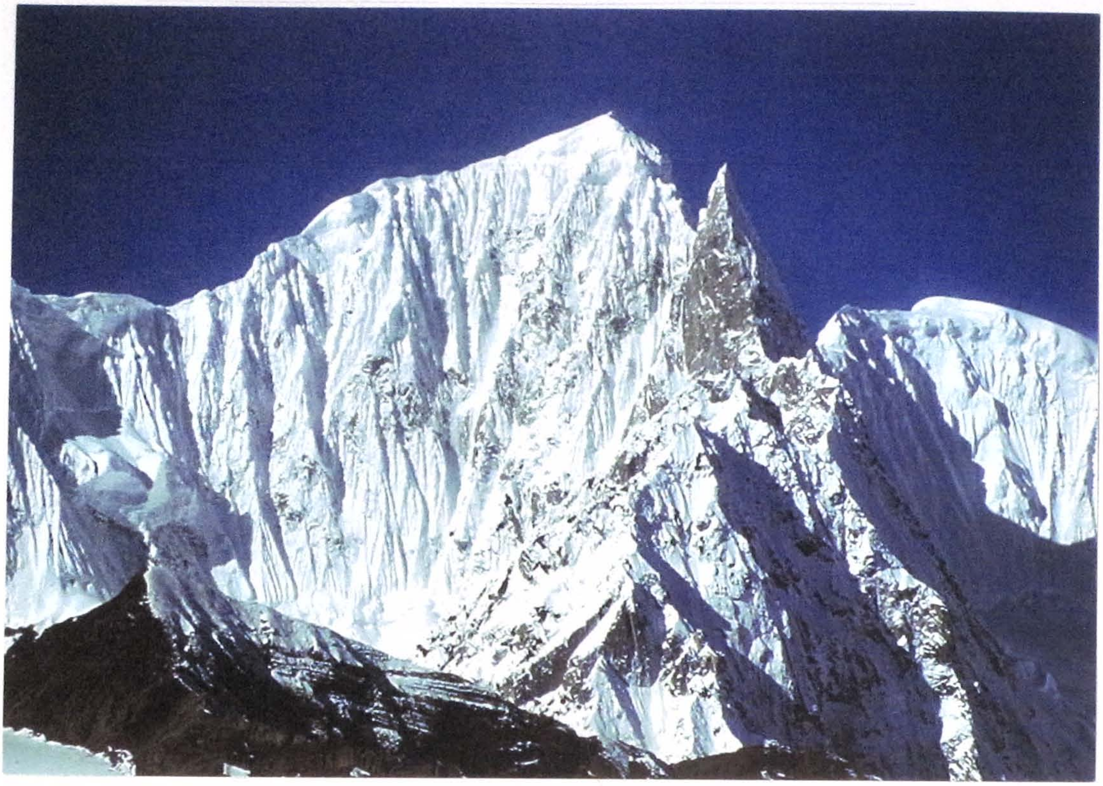
Lhagu Glacier, Kangri Garpo East – Silver Turtle



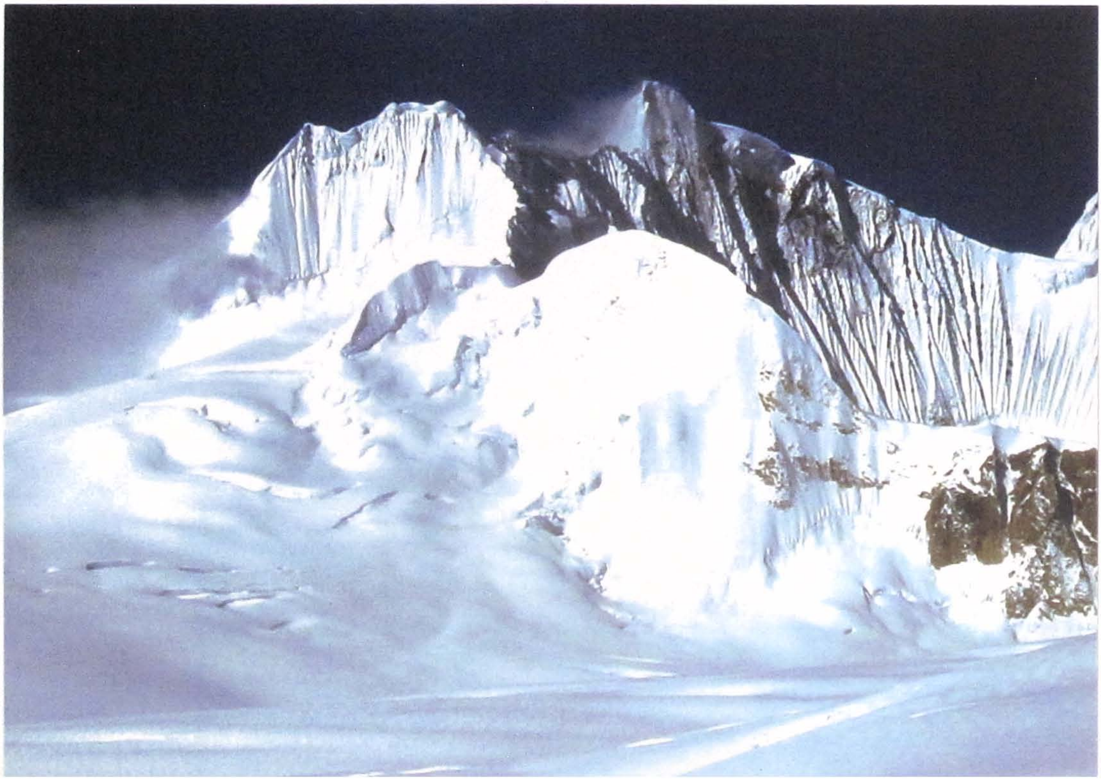
Lhagu Glacier, branch glacier – Hiqen III ca. 6000m (left) and Hiqen I (Gongyada) 6423m, Northeast face, Kangri Garro East – Silver Turtle



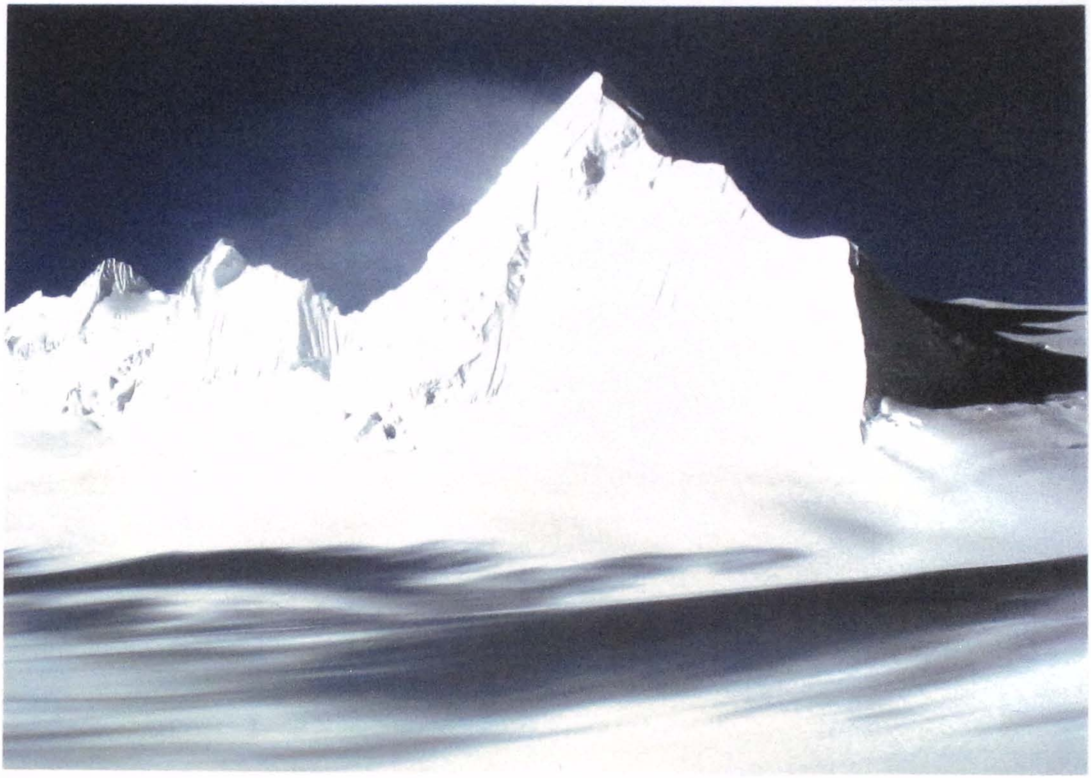
Luqendo I ca. 6400m, Northeast face, Kangri Garpo East – Silver Turtle



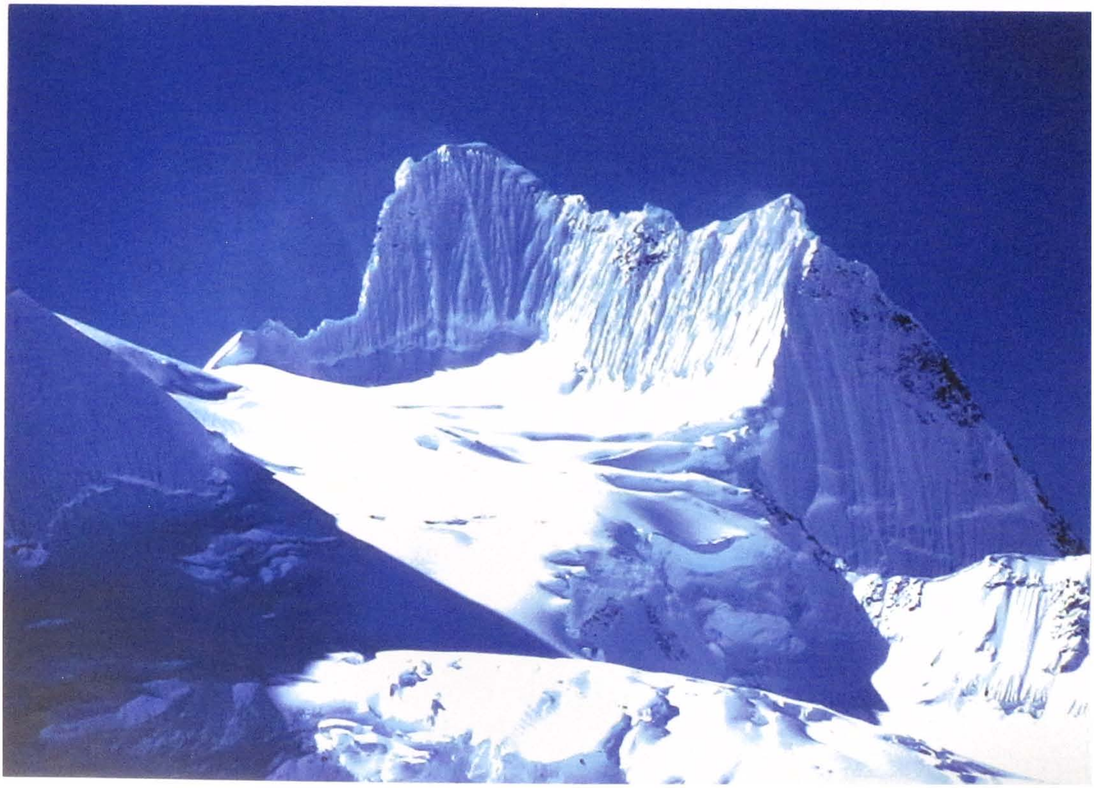
Unnamed 6321m peak, NE face, Lhagu Glacier, Kangri Garpo East – Silver Turtle



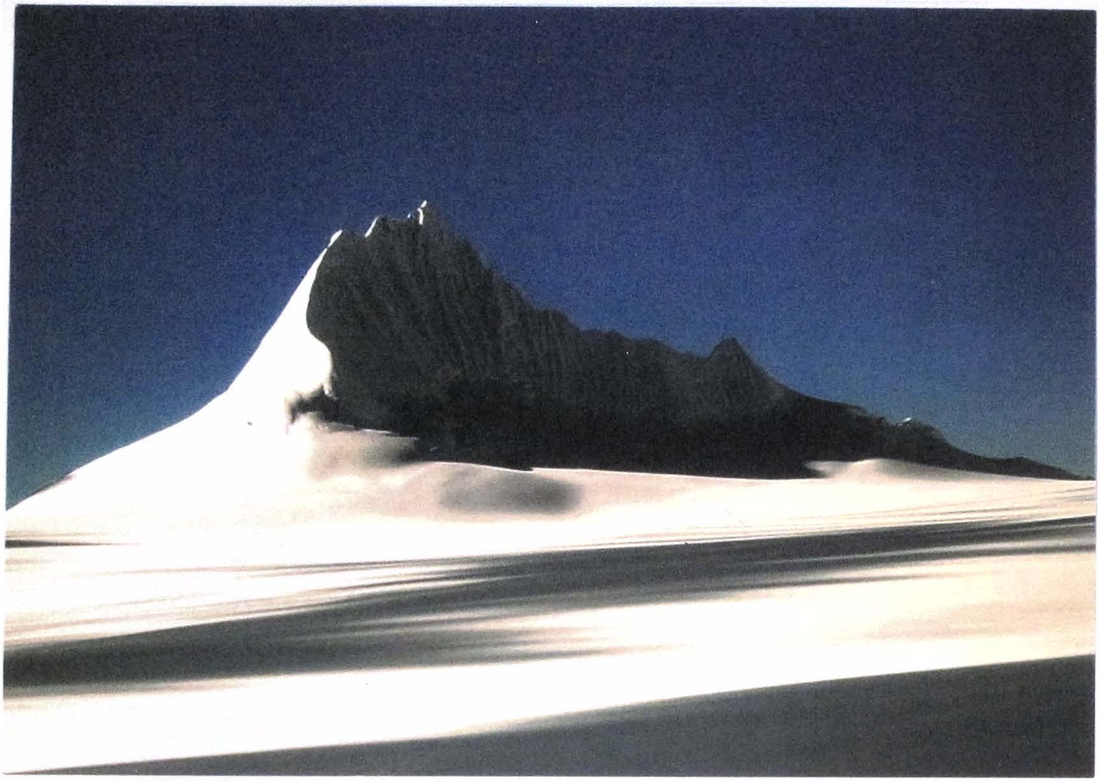
Unnamed 6006m peak, NE face, Lhagu Glacier, Kangri Garpo East – Silver Turtle



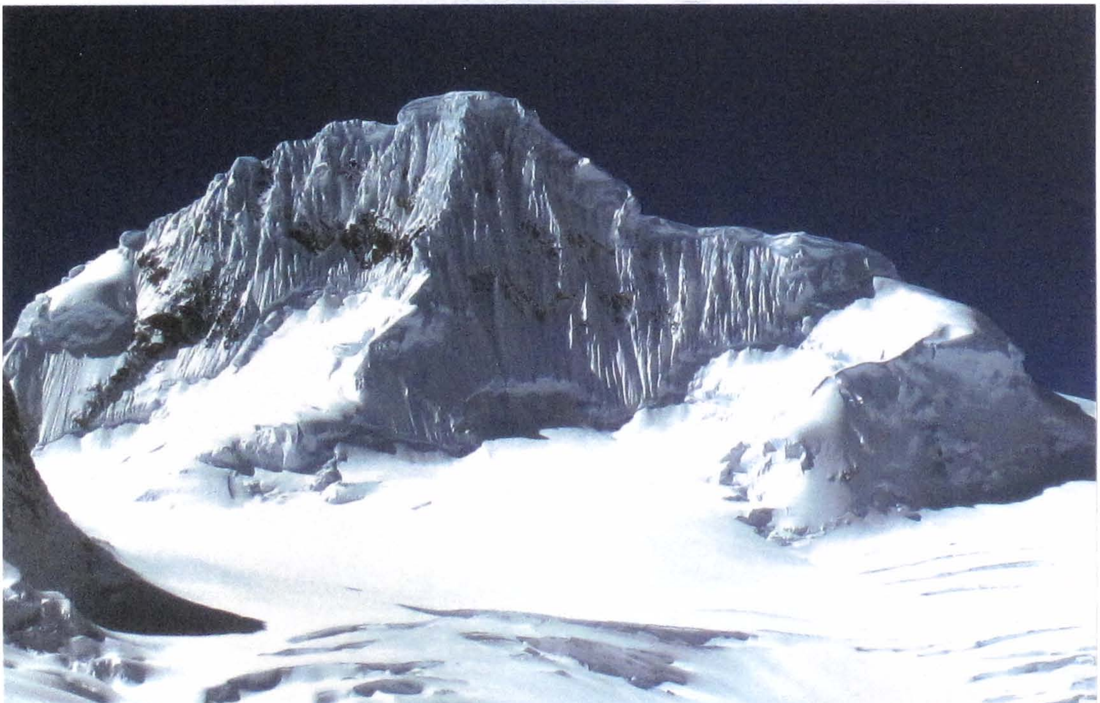
Luqendo II . 6390m, North face, Kangri Garpo East – Silver Turtle



Unnamed 5480m peak, North face, Lhagu Glacier, Kangri Garpo East – Silver Turtle

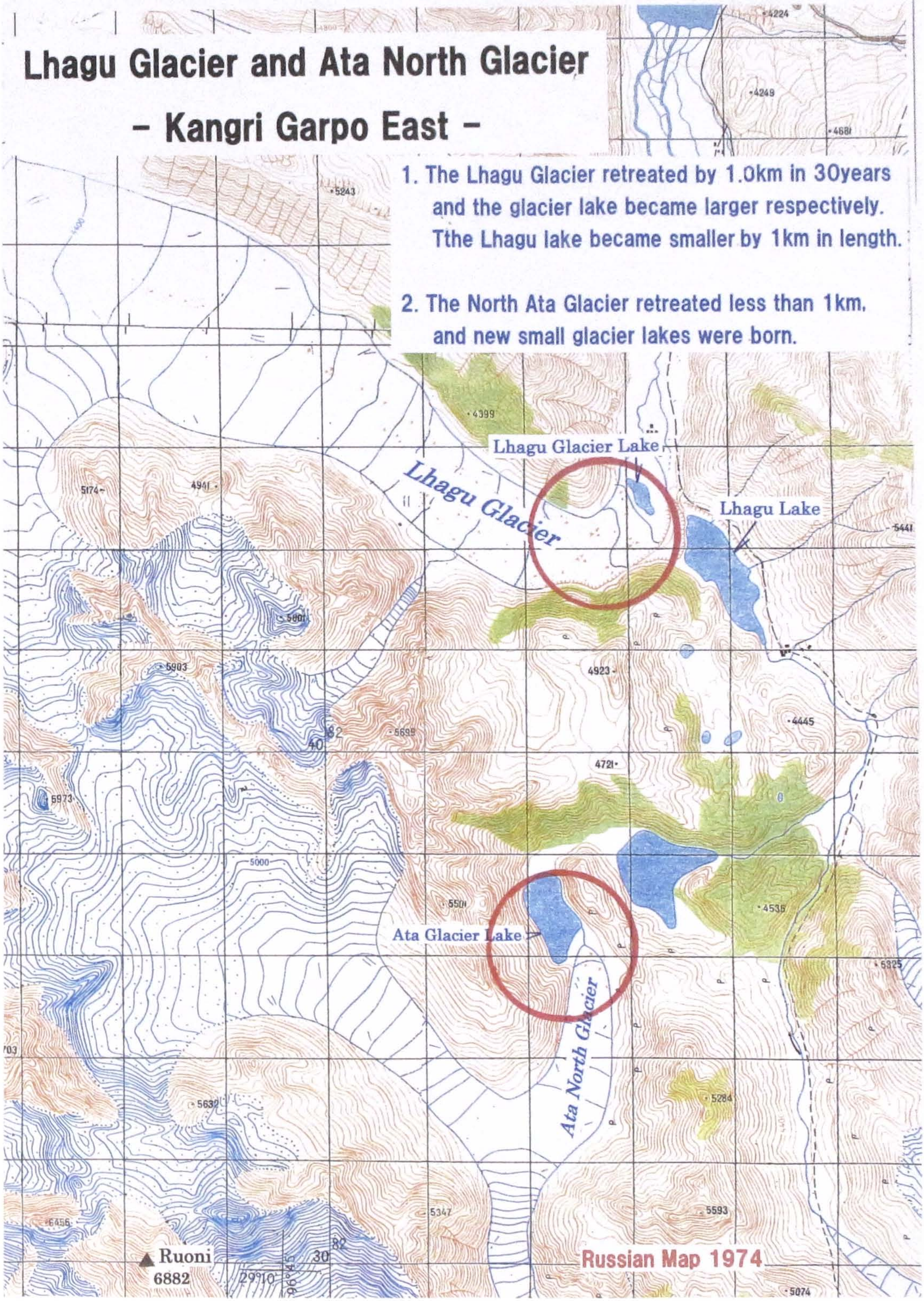


Unnamed 6405m (Chinese map: 6606m) peak, Northeast face, Lhagu Glacier, Kangri Garpo East – Silver Turtle



Lhagu Glacier and Ata North Glacier

- Kangri Garpo East -



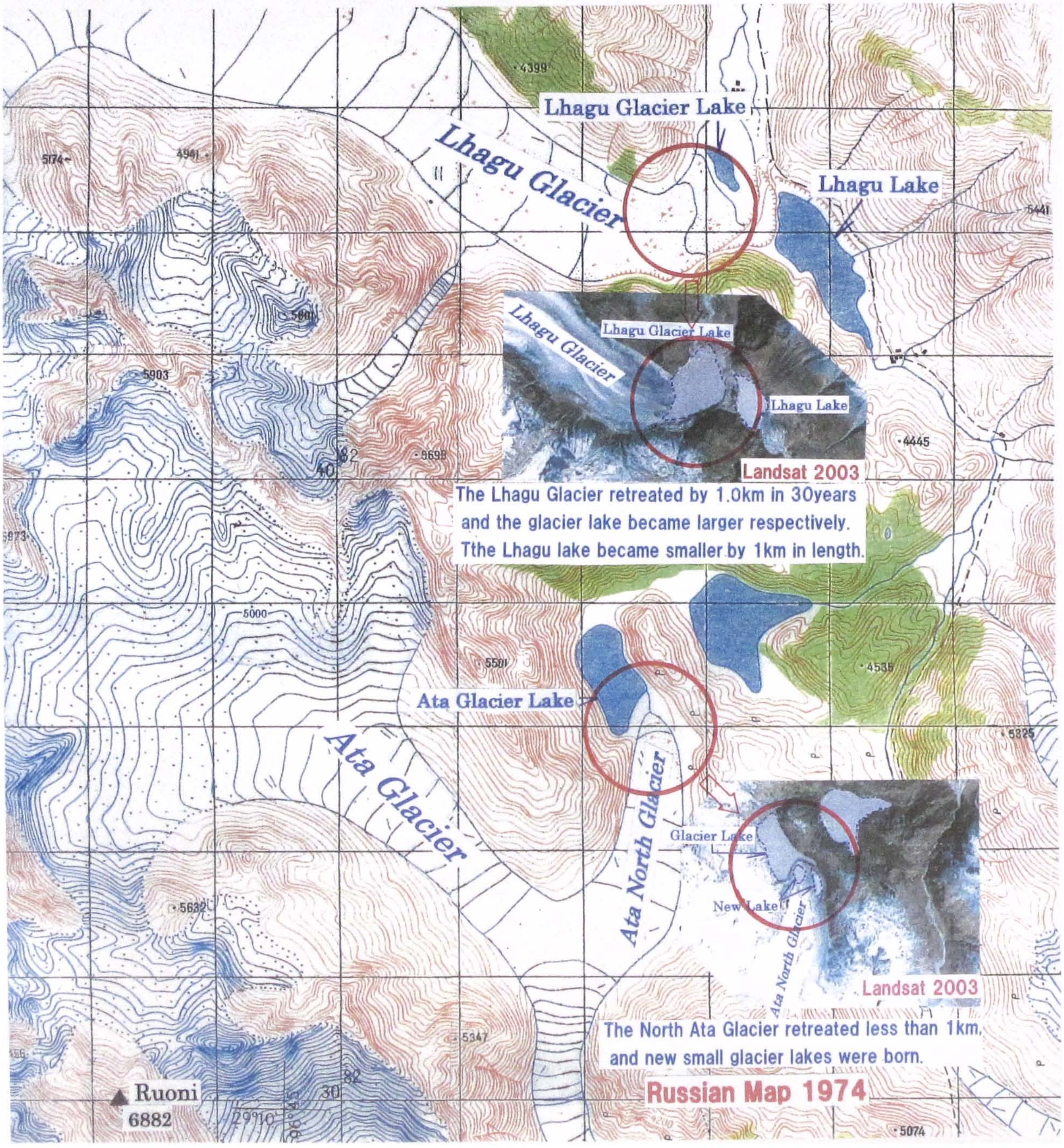
1. The Lhagu Glacier retreated by 1.0km in 30years and the glacier lake became larger respectively. Tthe Lhagu lake became smaller by 1km in length.

2. The North Ata Glacier retreated less than 1km. and new small glacier lakes were born.

Russian Map 1974

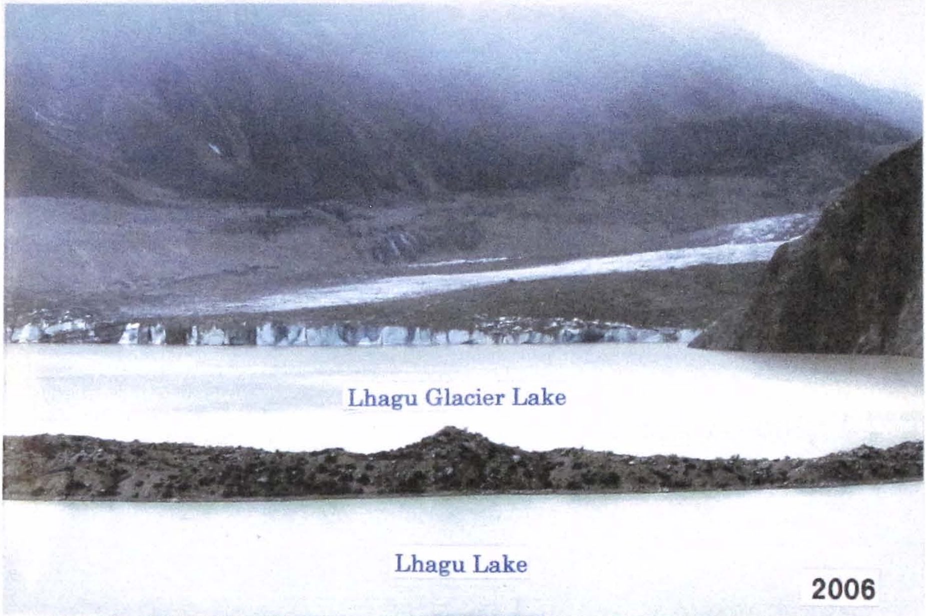
Lhagu Glacier and Ata North Glacier

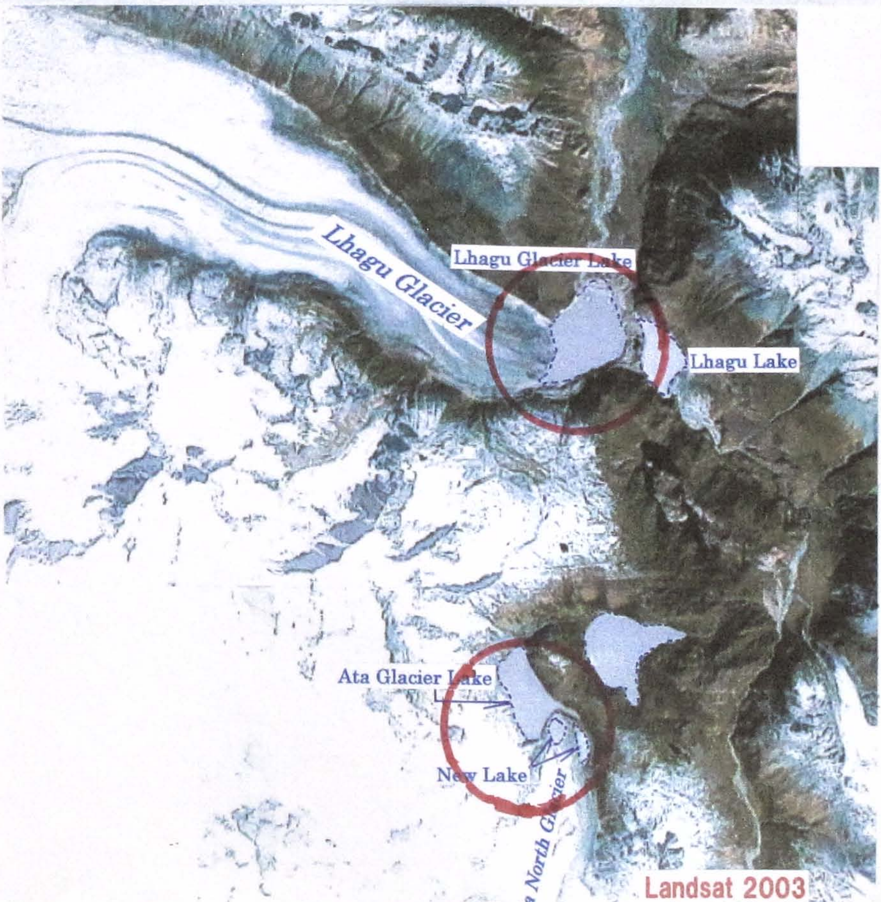
- Kangri Garpo East -

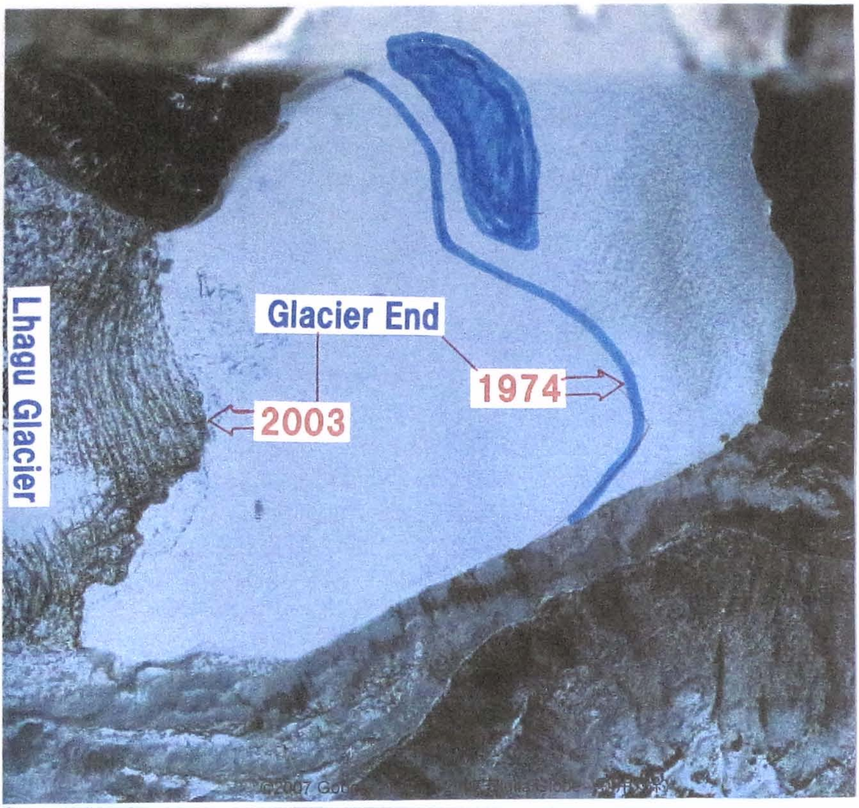


The Lhagu Glacier retreated by 1.0km in 30years and the glacier lake became larger respectively. Tthe Lhagu lake became smaller by 1km in length.

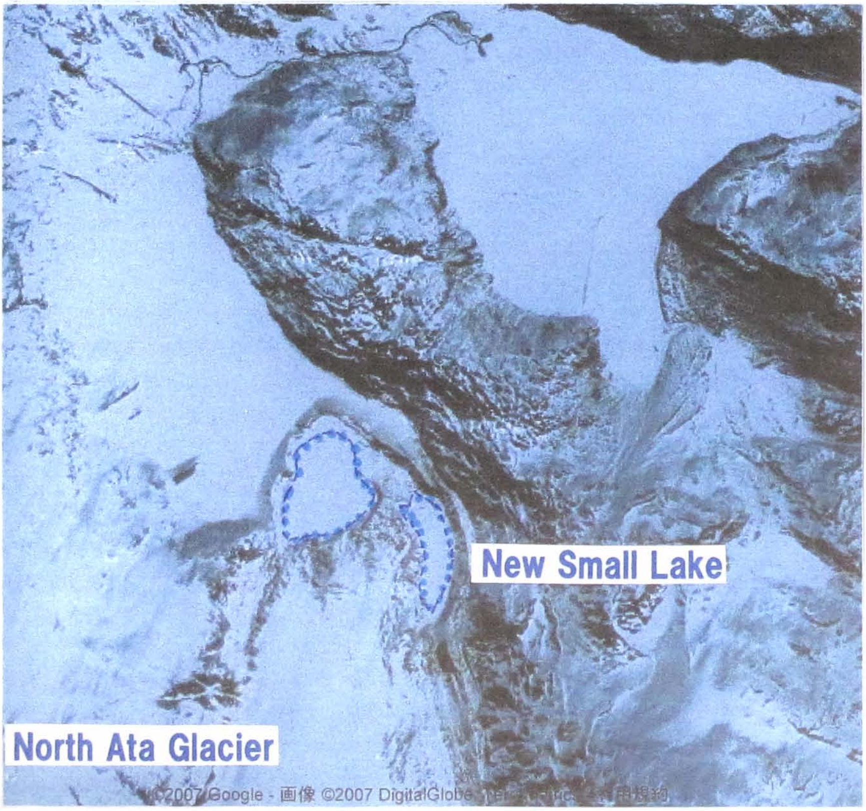
The North Ata Glacier retreated less than 1km, and new small glacier lakes were born.


Lhagu Glacier Lake
Lhagu Lake
2006


Lhagu Glacier
Lhagu Glacier Lake
Lhagu Lake
Ata Glacier Lake
New Lake
Ata North Glacier
Landsat 2003

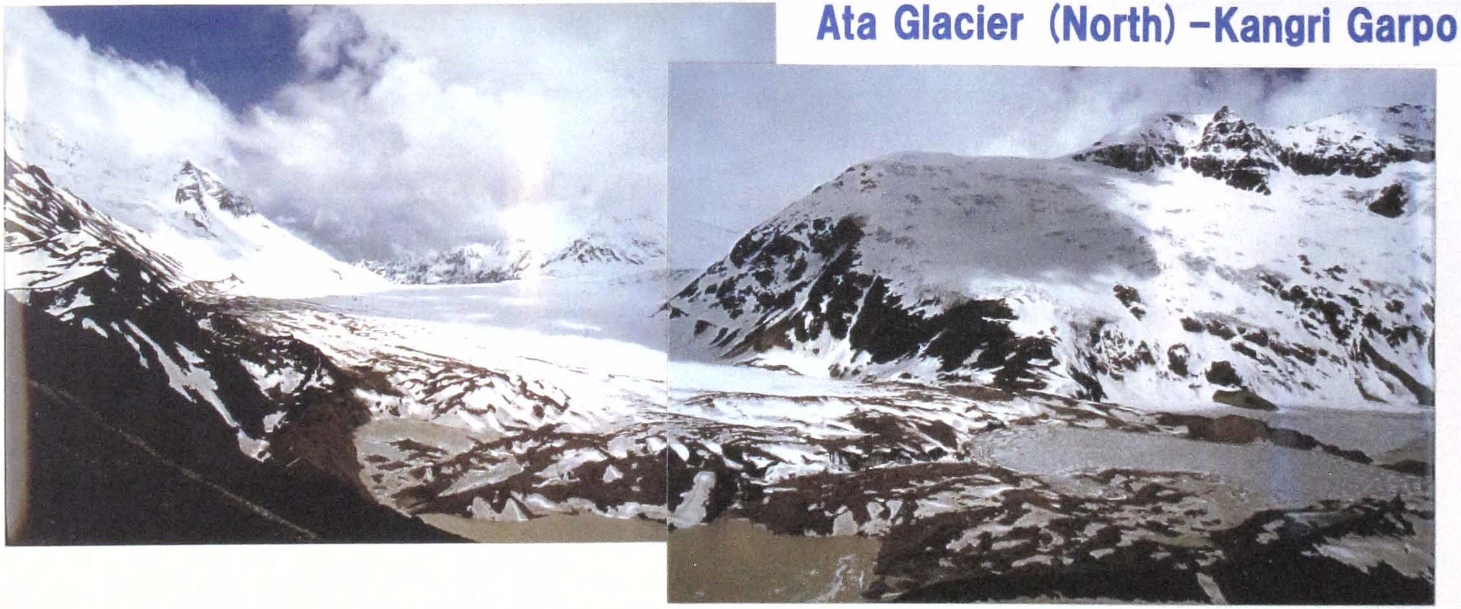


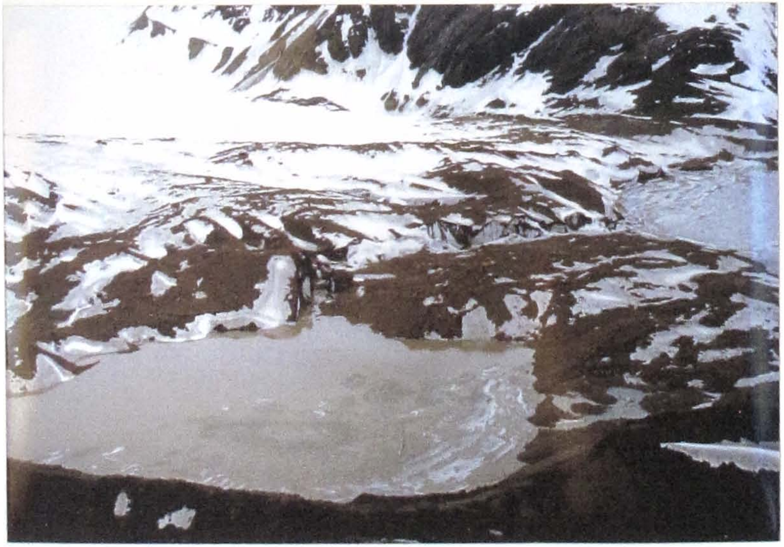
Lhagu Glacier
Glacier End
1974
2003
©2007 Google

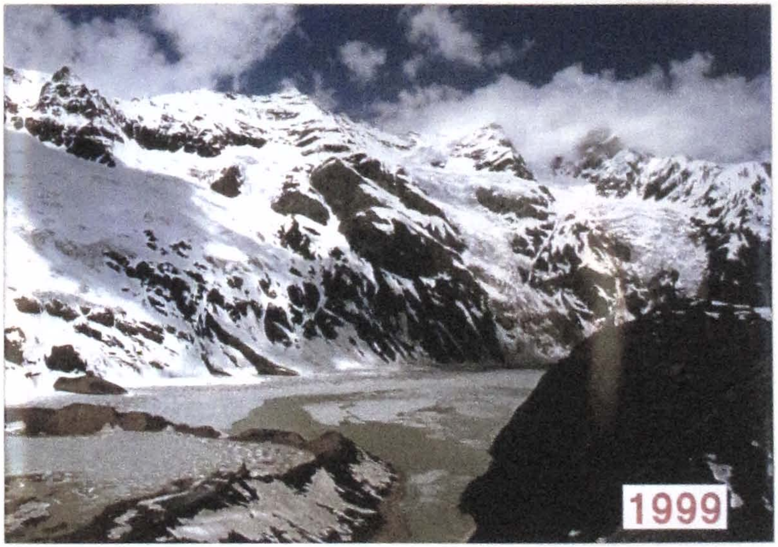


New Small Lake
North Ata Glacier
©2007 Google - 画像 ©2007 DigitalGlobe

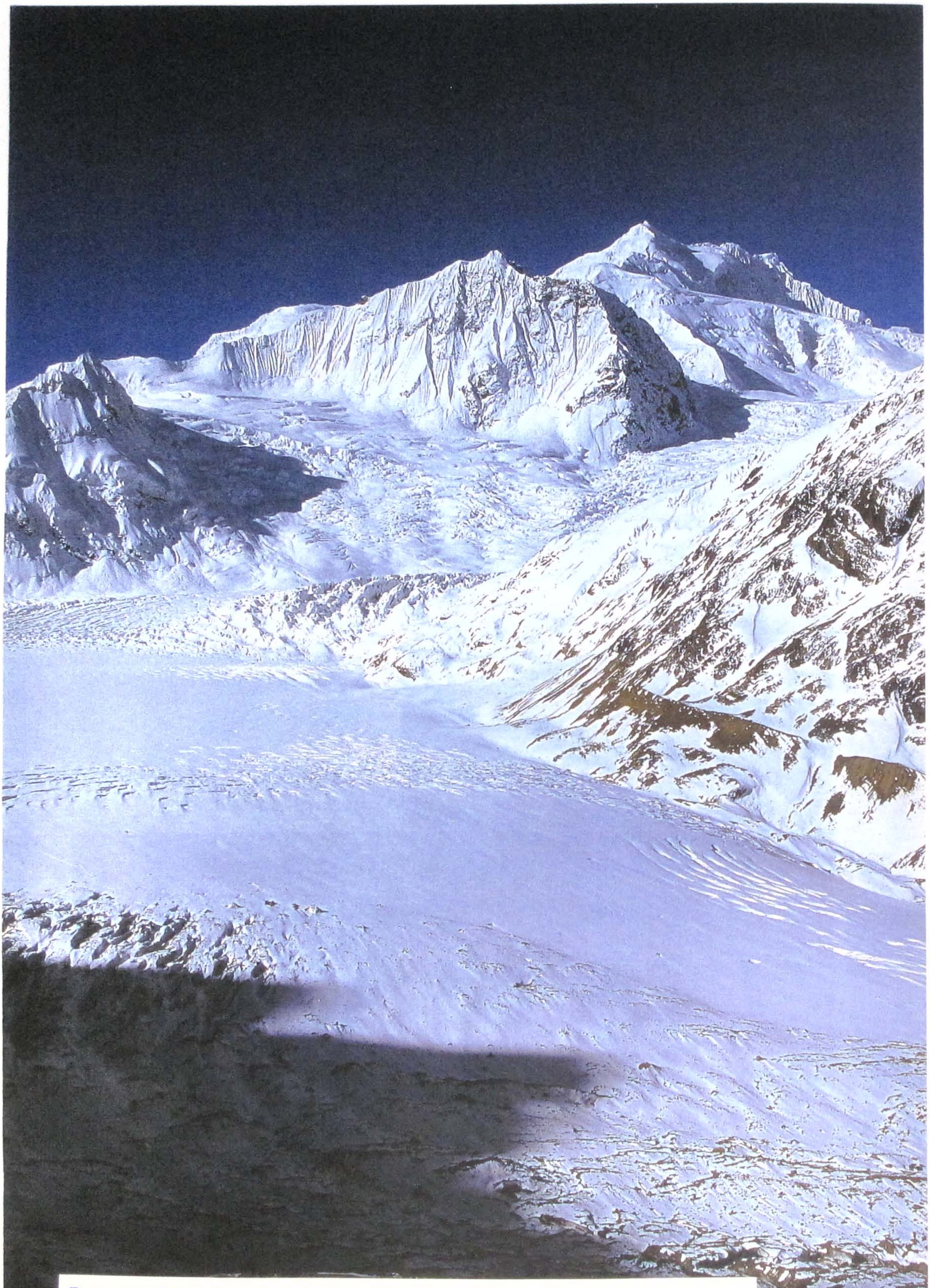
Ata Glacier (North) -Kangri Garpo





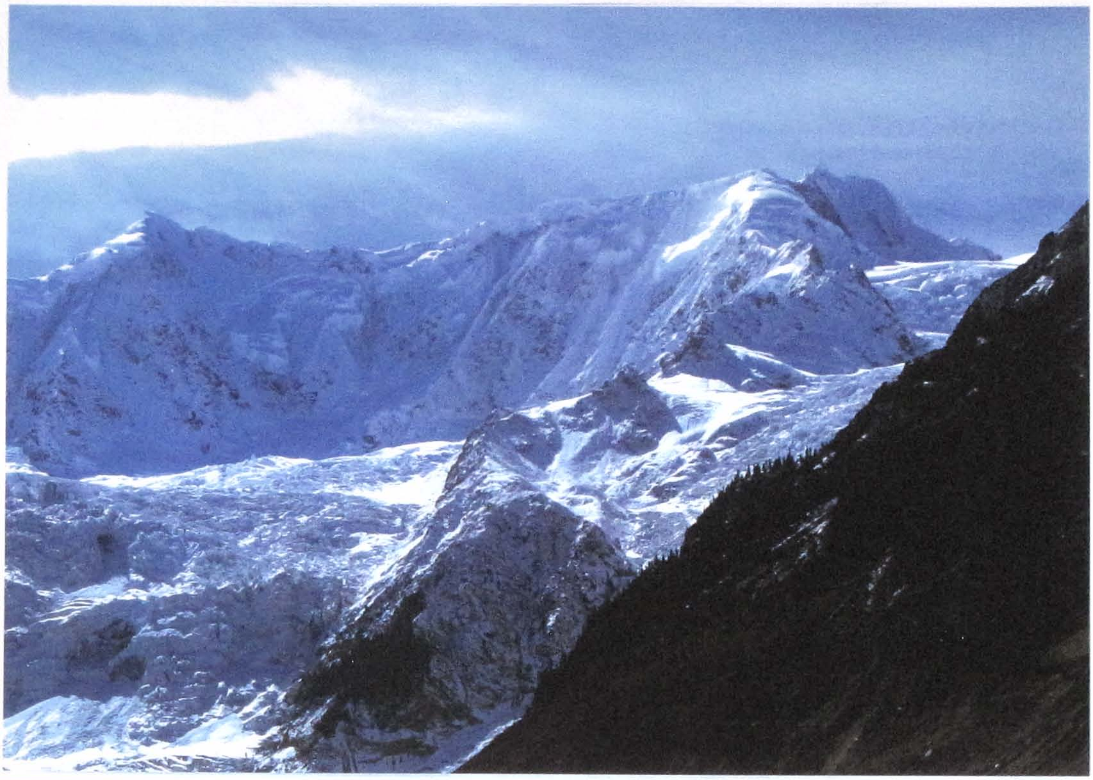


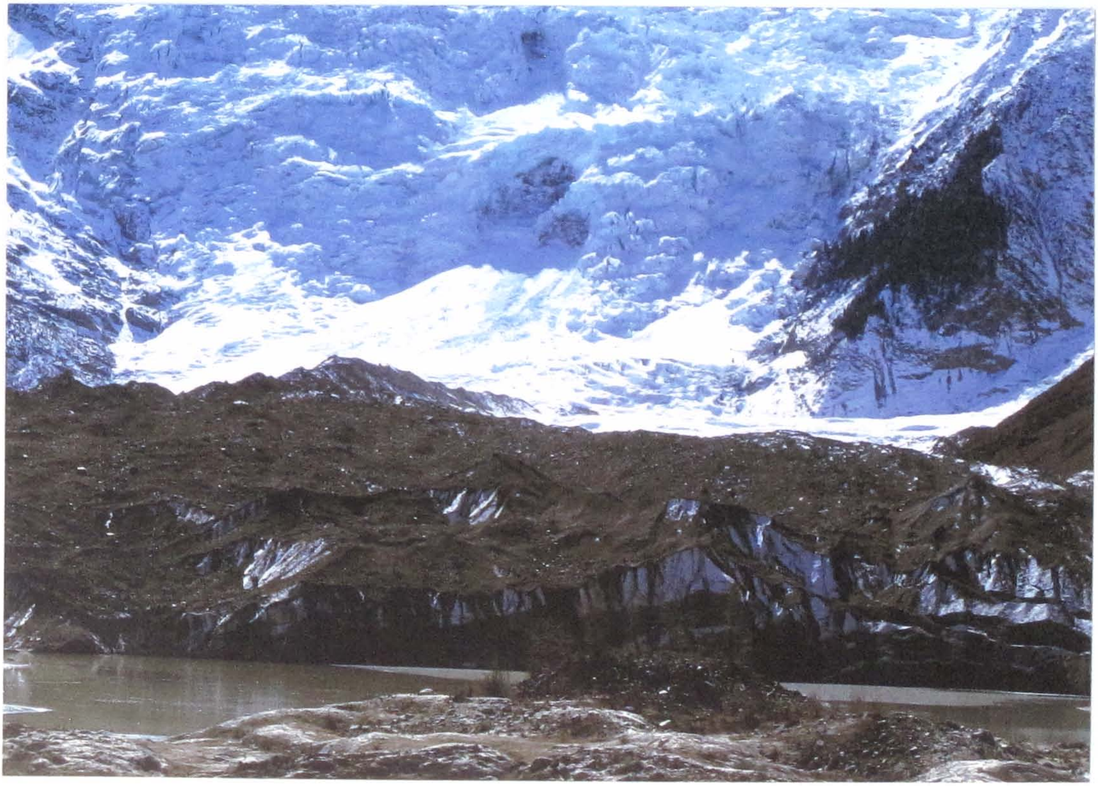
1999



Ruoni 6882m, Northeast Face, the highest peak in Kangri Garpo range

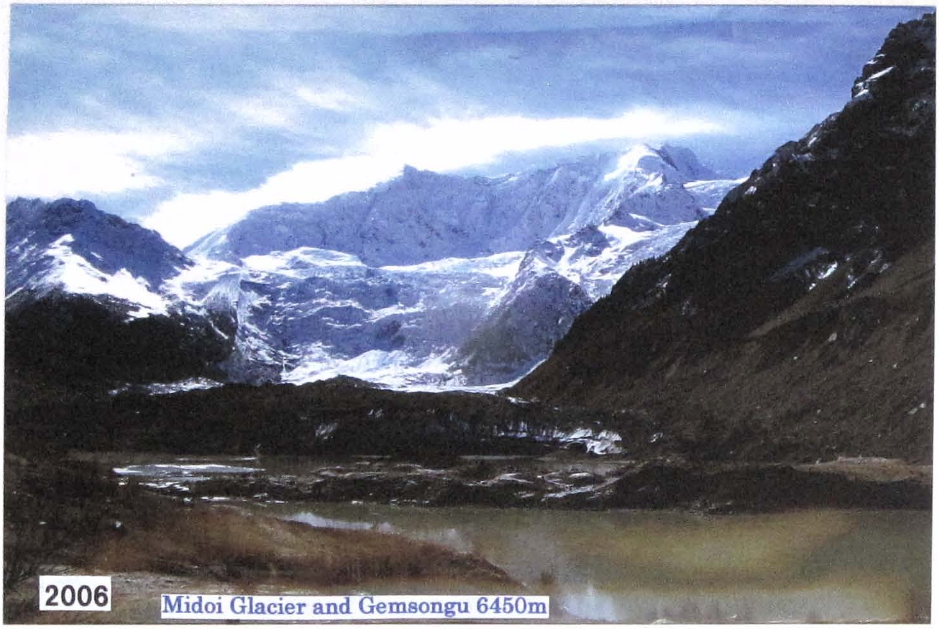
Gemsongu 6540m, North face, Midoi Glacier, Kangri Garpo East



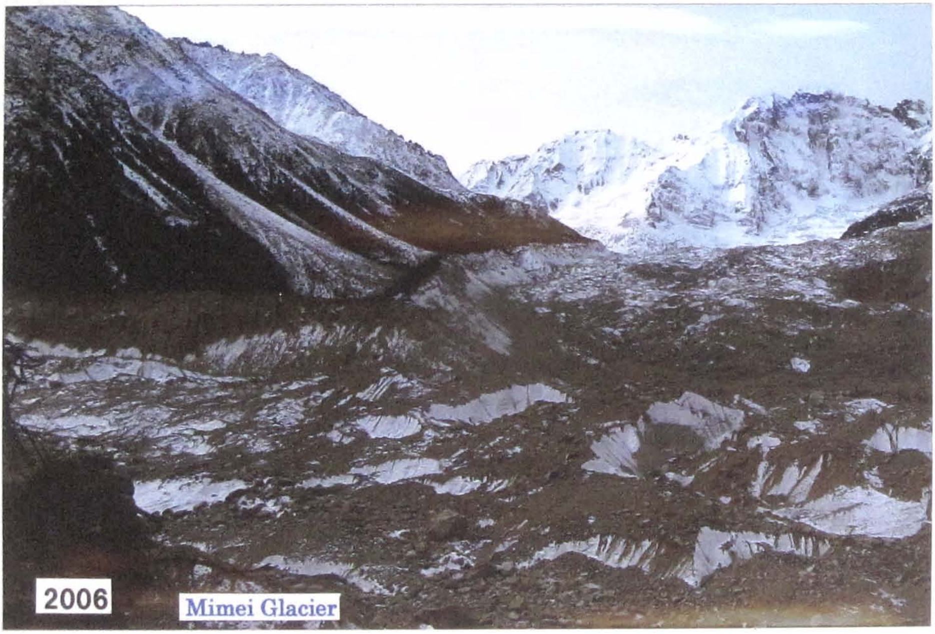


Midoi Glacier and Mimei Glacier

- Kangri Garpo East -

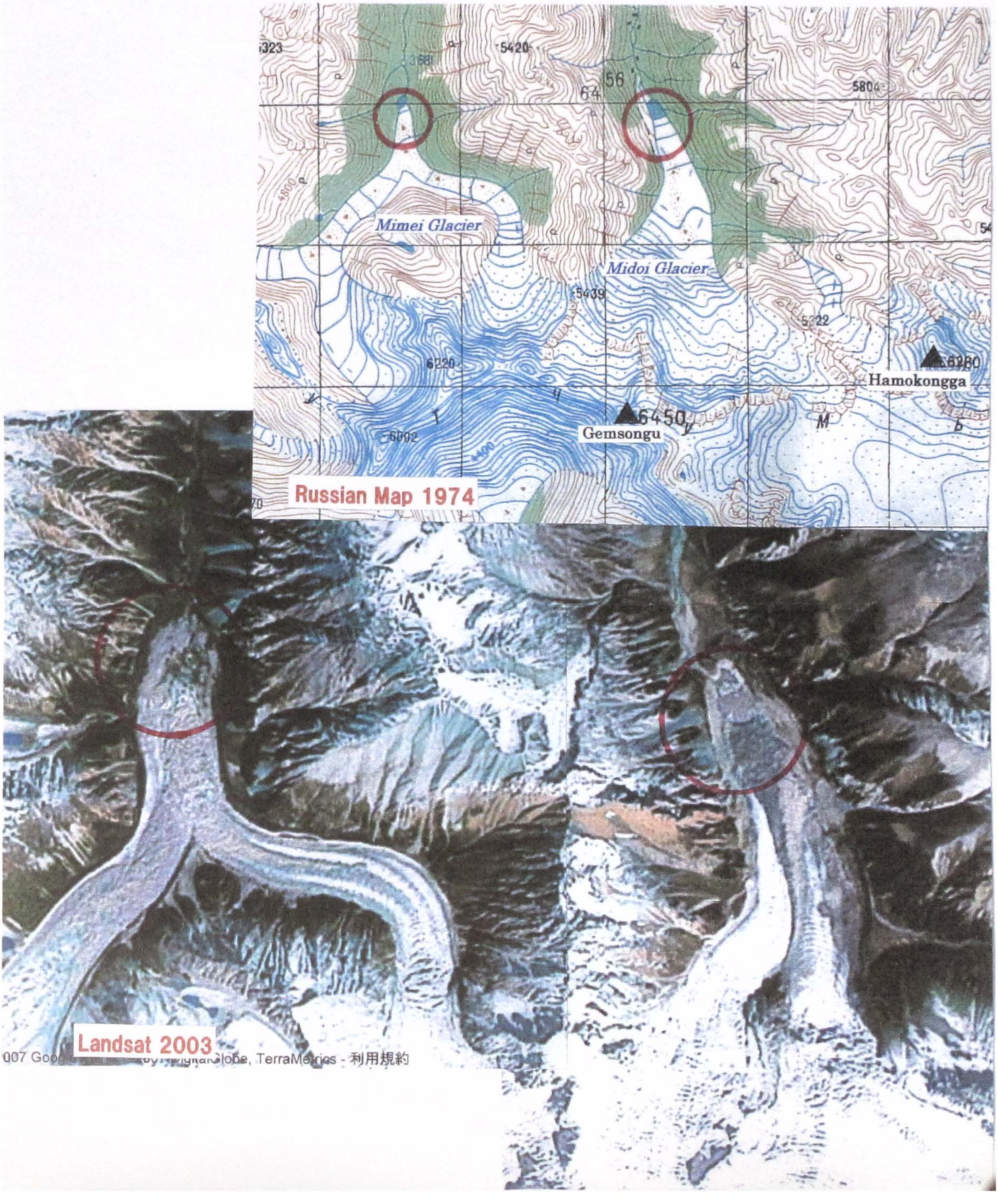


2006 Midoi Glacier and Gemsongu 6450m

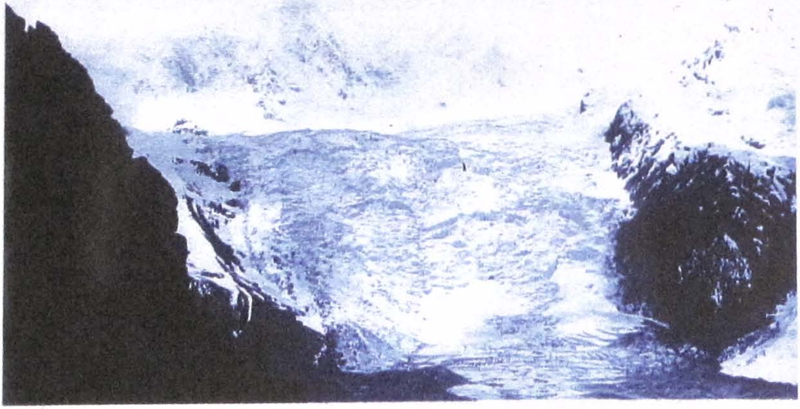


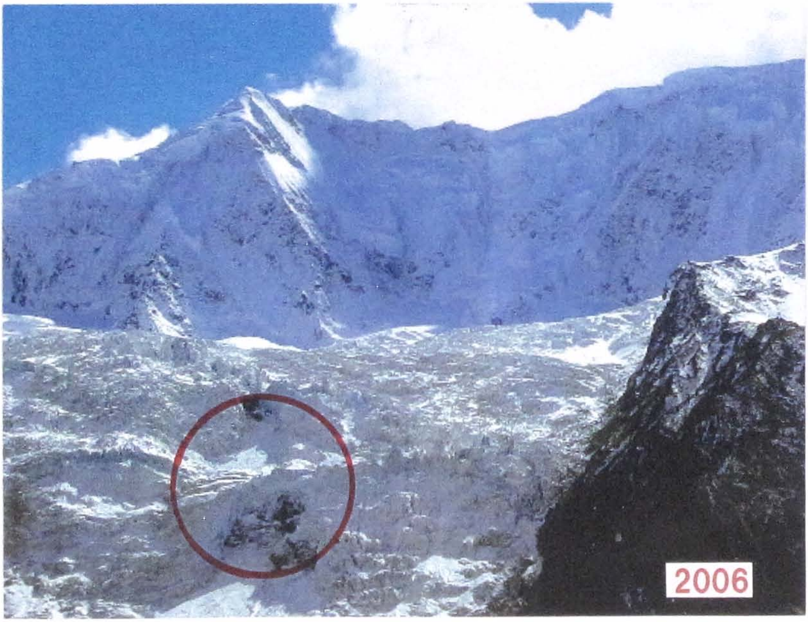
2006 Mimei Glacier

1. **Midor Glacier:**
   Retreated by about 200m and the lakes became two in 30 years.
2. **Mimei Glacier:**
   No eminent retreat is seen but a small lake disappeared in 30 years.

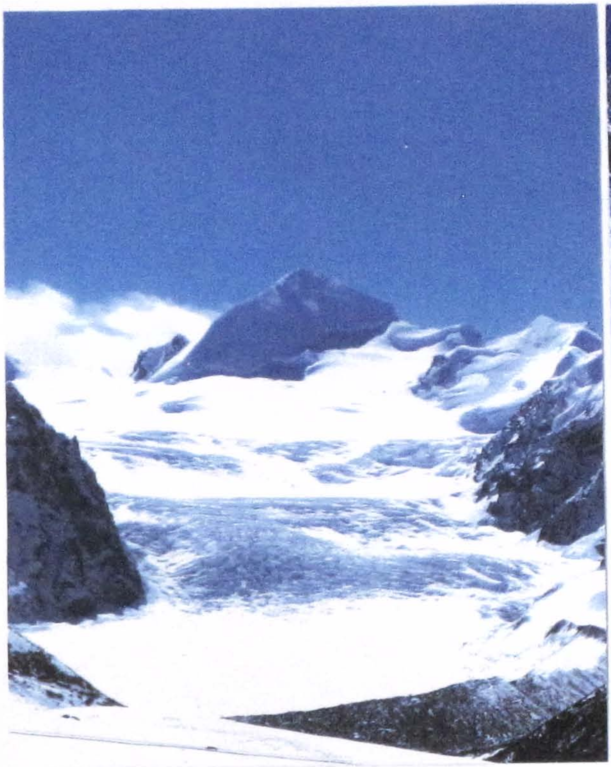


Ice Fall of Midoi Glacier – Kangri Garpo East

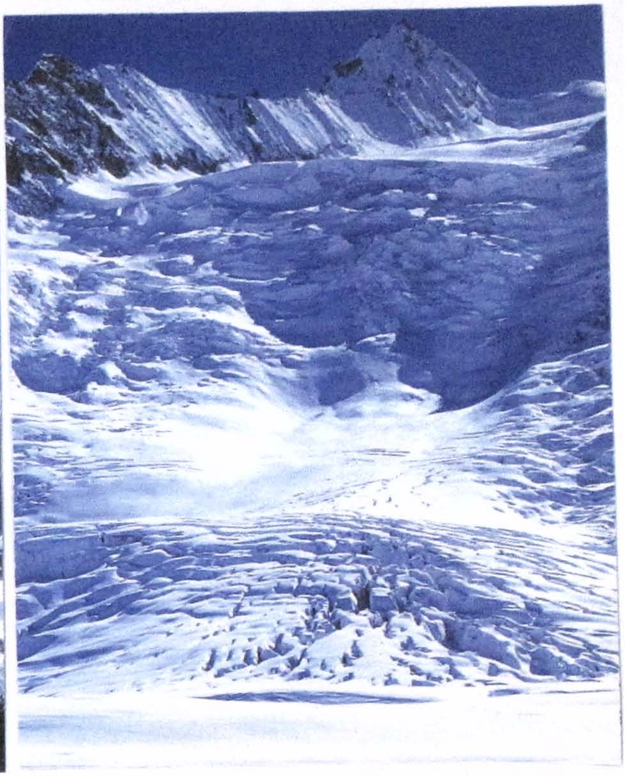




Glacier in Kangri Garpo East

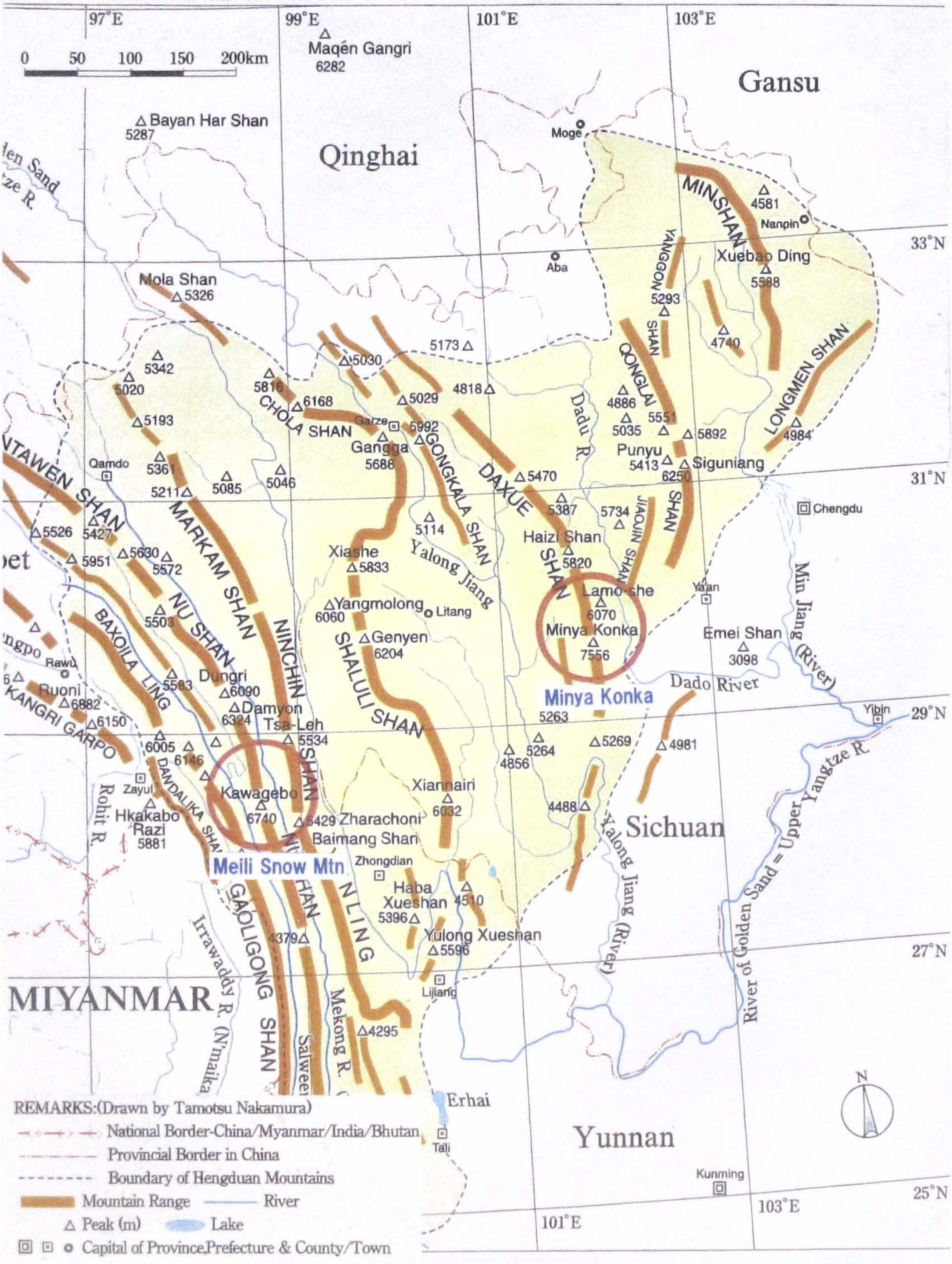


Glacier to Ata Kang La, Kangi Garpo East



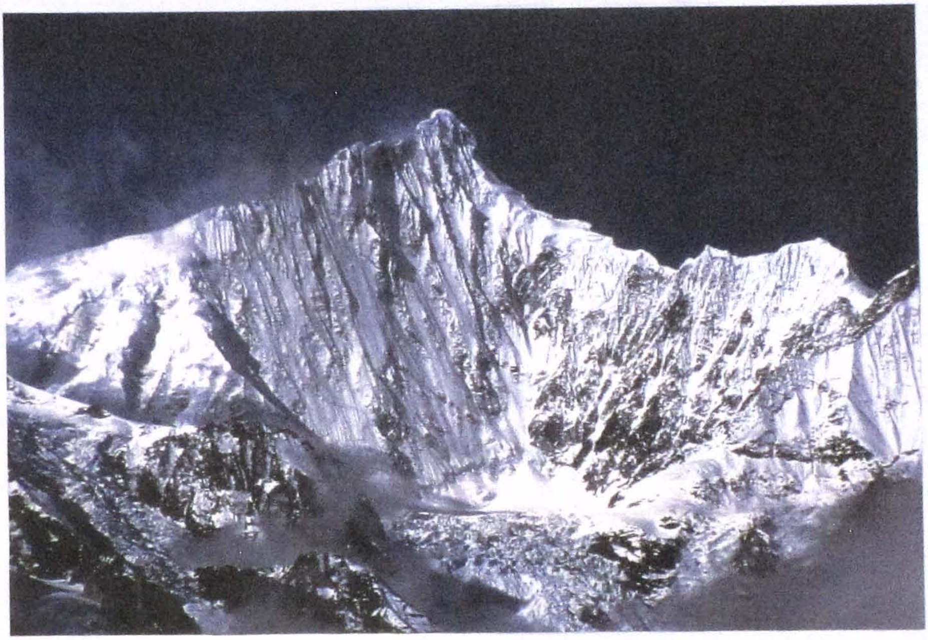
Dojitsengza 5662m, East face, Kangri Garpo East

4. Hengduan Mountains-Gorge Country

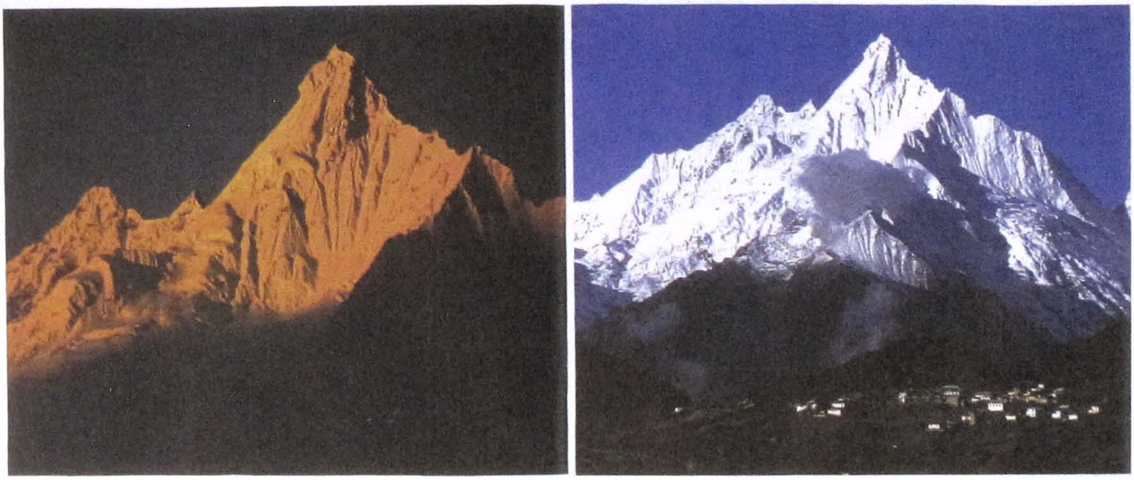


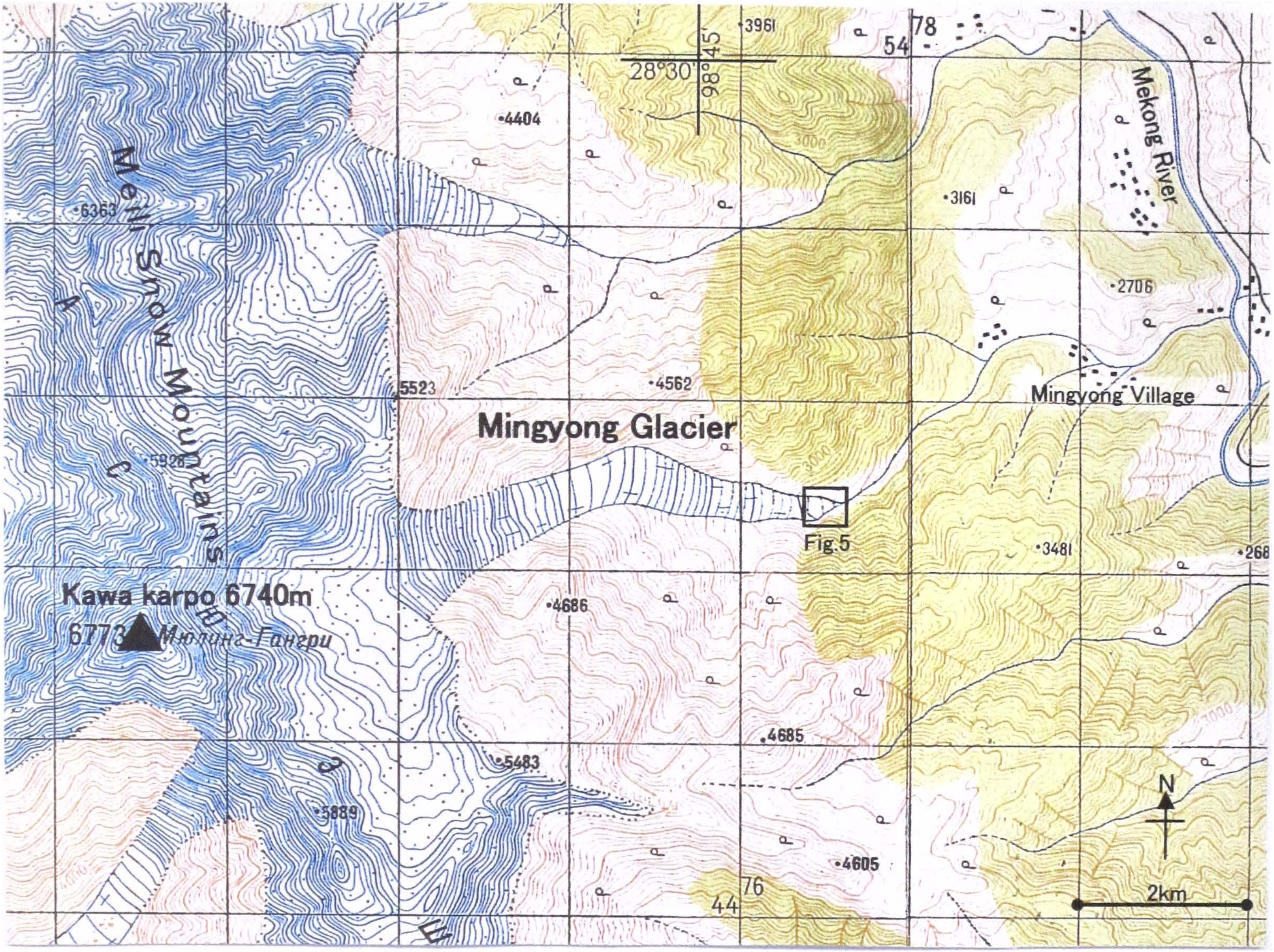
Information source on Meili Snow Mountains: Naoyuki Kobayashi

Kawa Karpo 6740m, East face, Meili Snow Mountains

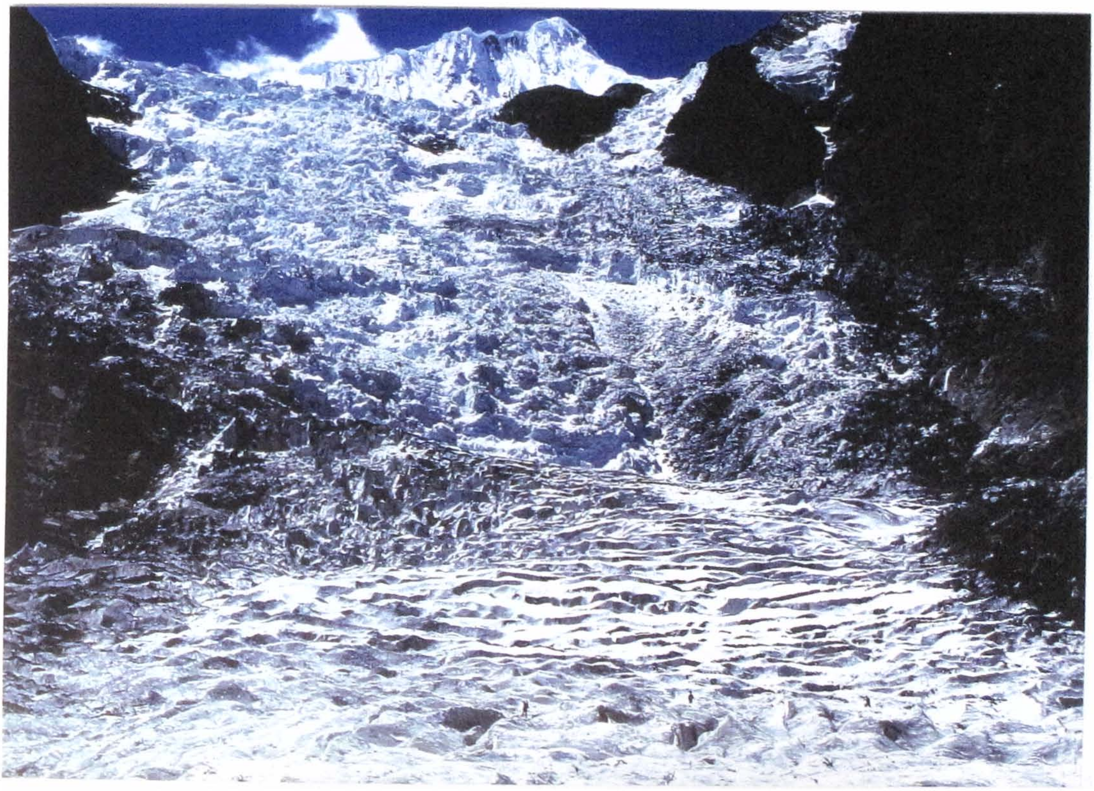


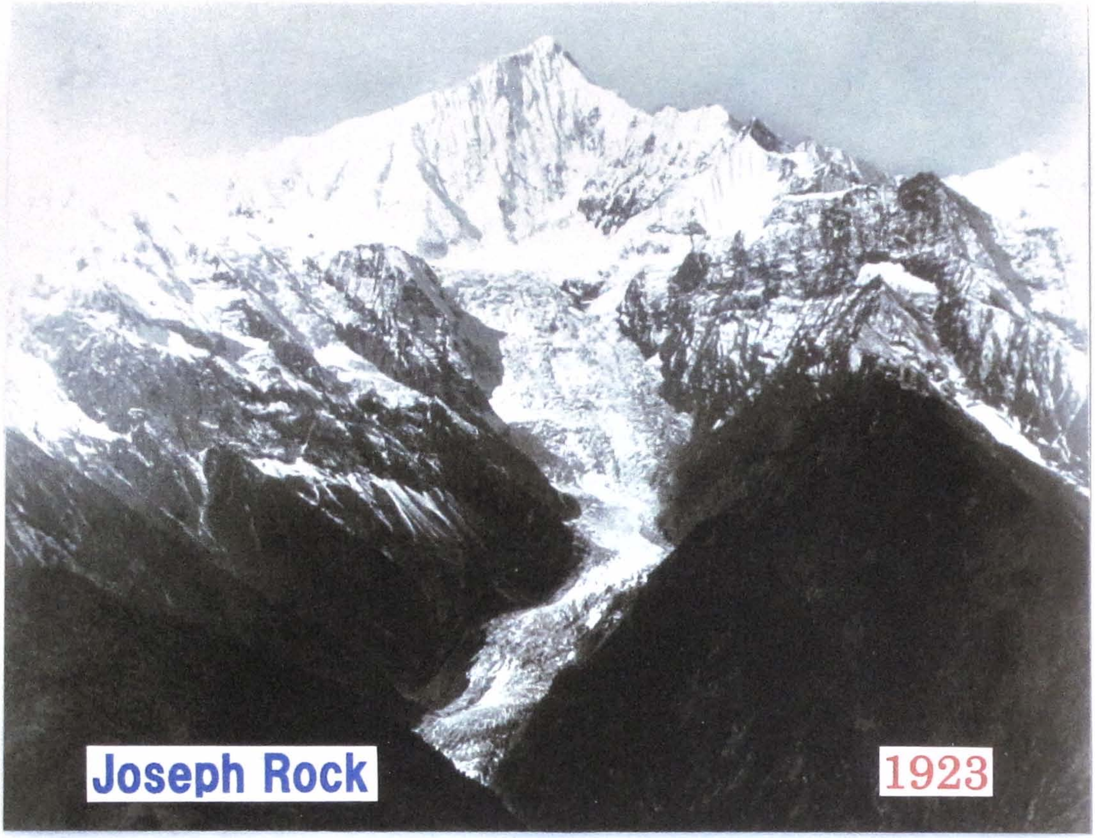
Mianzimu 6054m, East face, Meili Snow Mountains

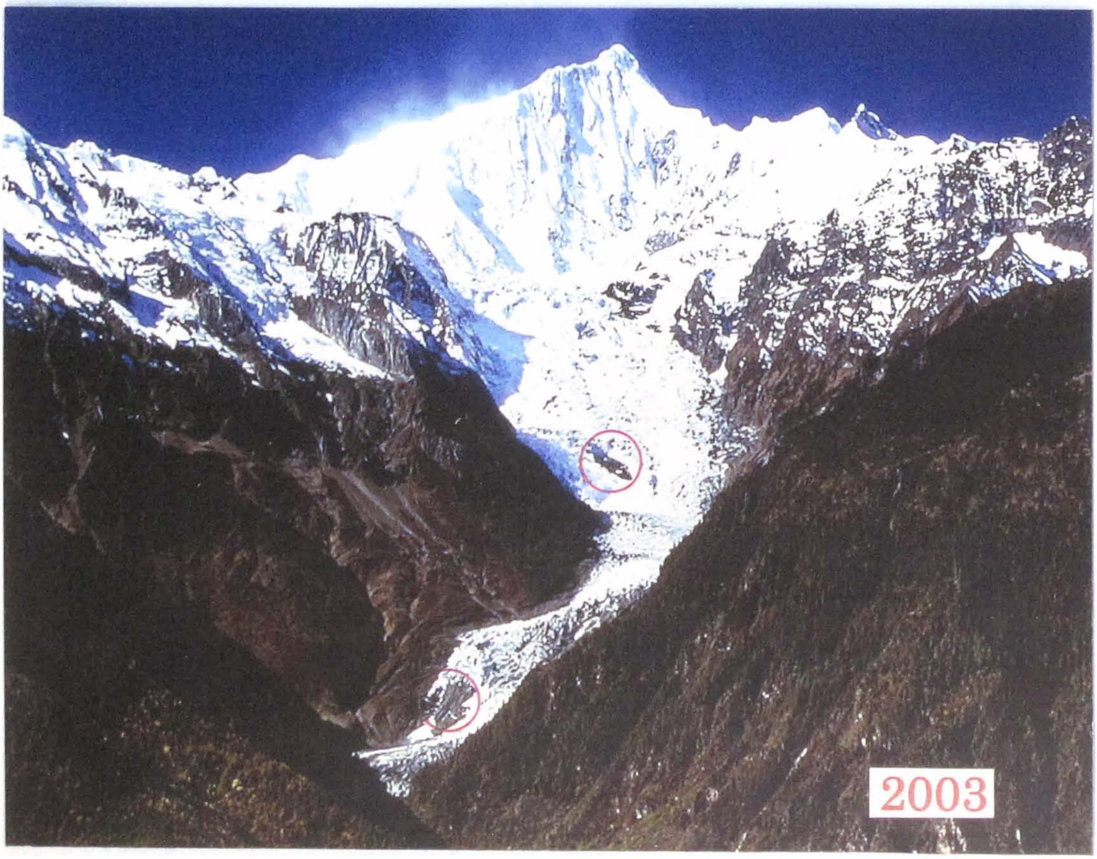


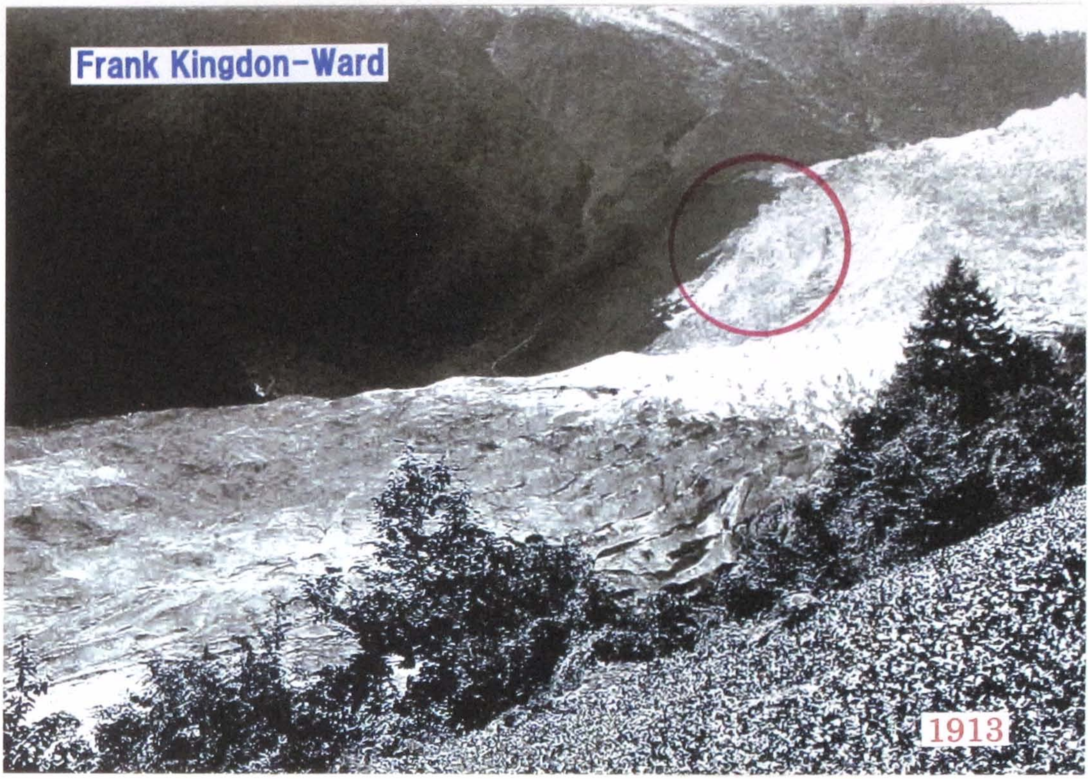

Meili Snow Mountains
Kawa karpo 6740m
6773
Мюлинг-Гангри
Mingyong Glacier
Mingyong Village
Mekong River
Fig.5
28°30'
98°45'
54
78
44
76
6363
5928
5523
5483
5889
4404
4562
4686
4685
4605
3961
3161
2706
3481
268
3000
N
2km

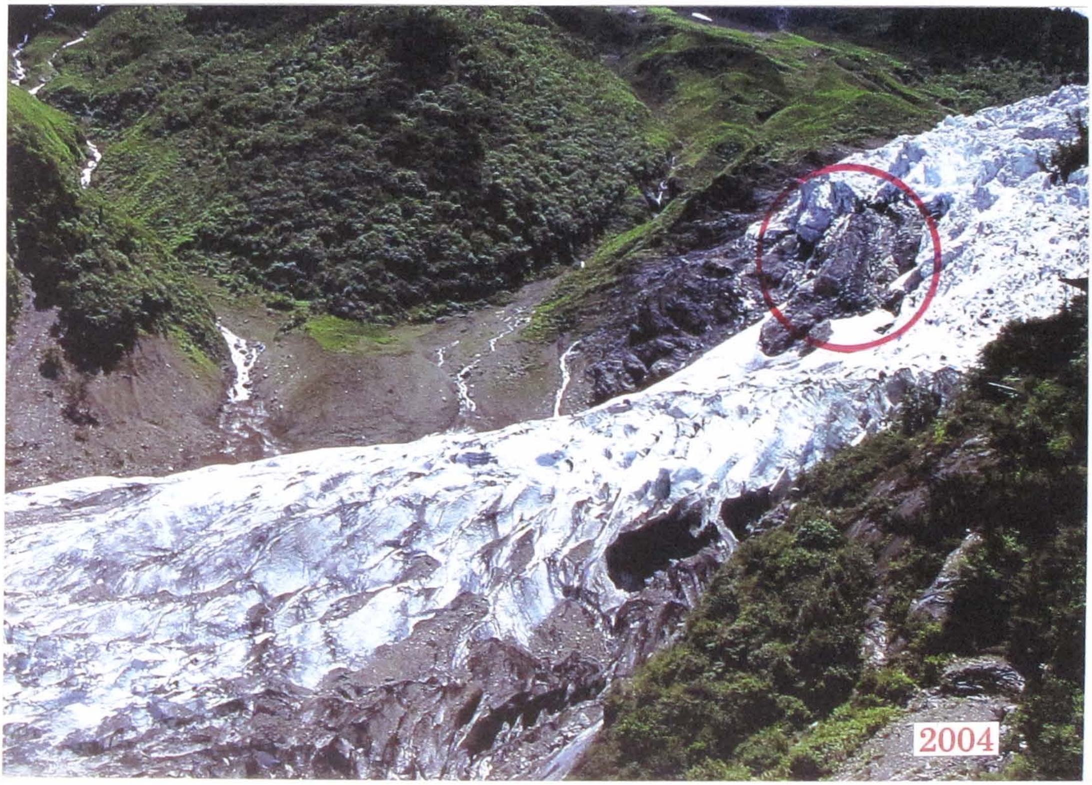
Meili Snow Mountains - Mingyong Glacier

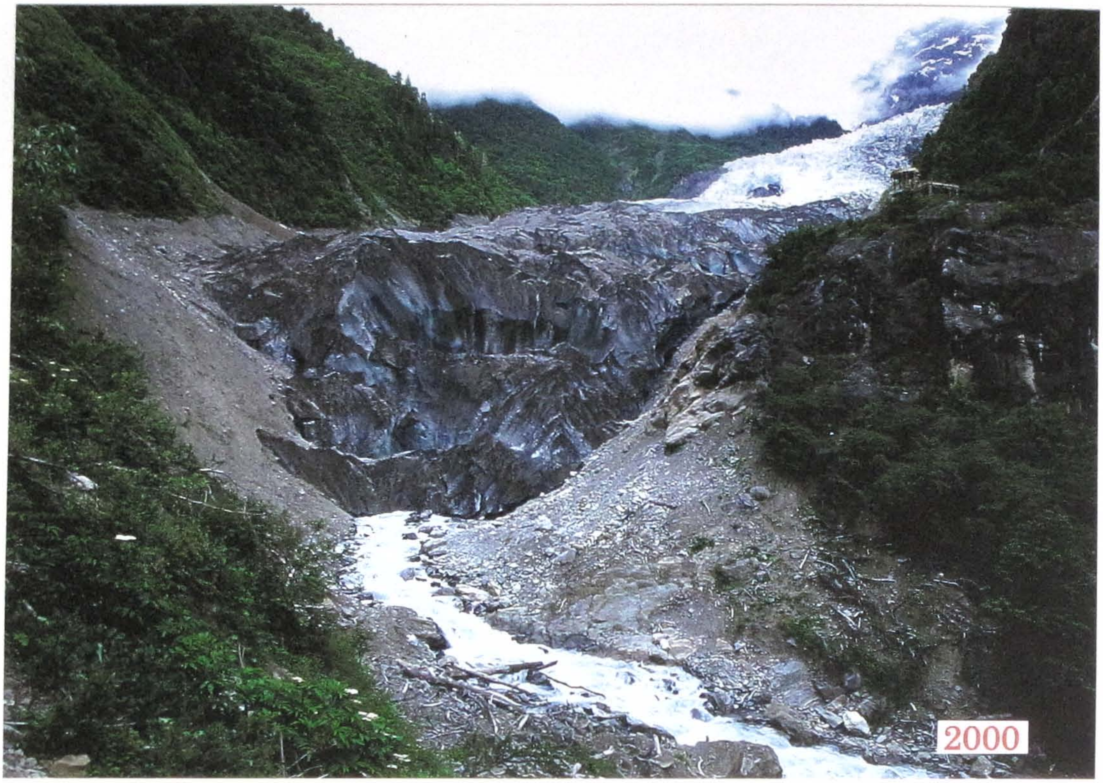



Joseph Rock
1923

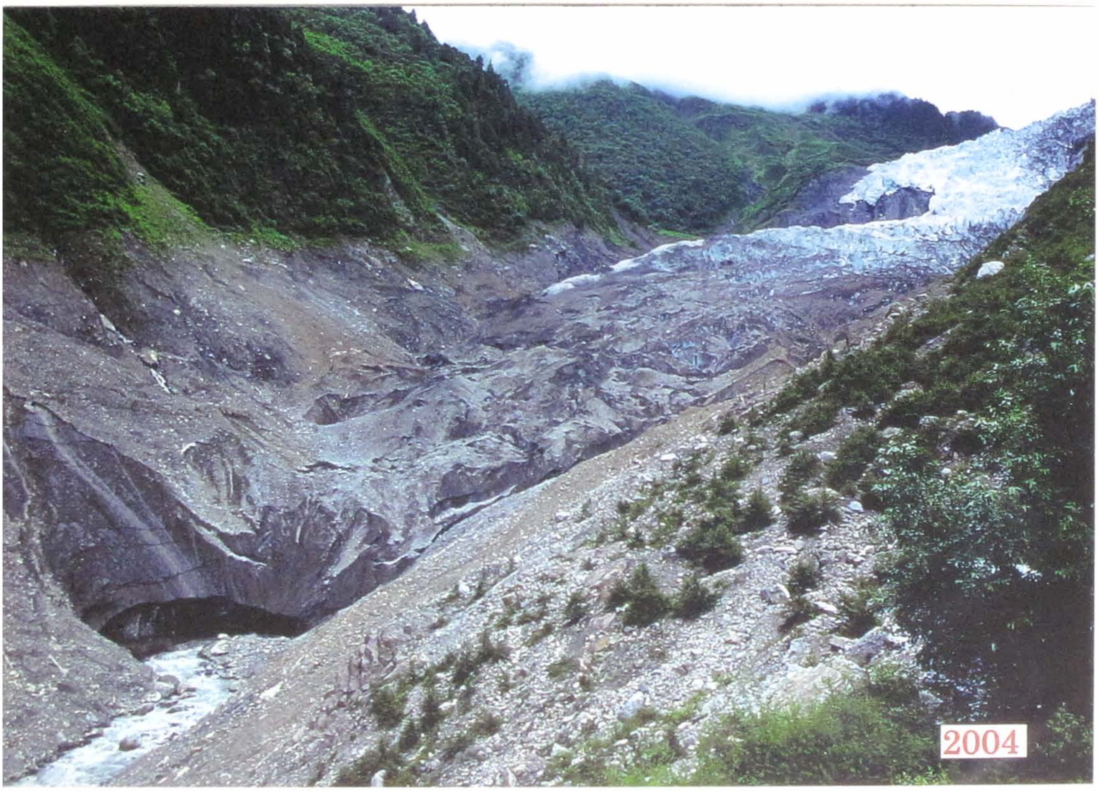

2003


Frank Kingdon-Ward
1913


2004

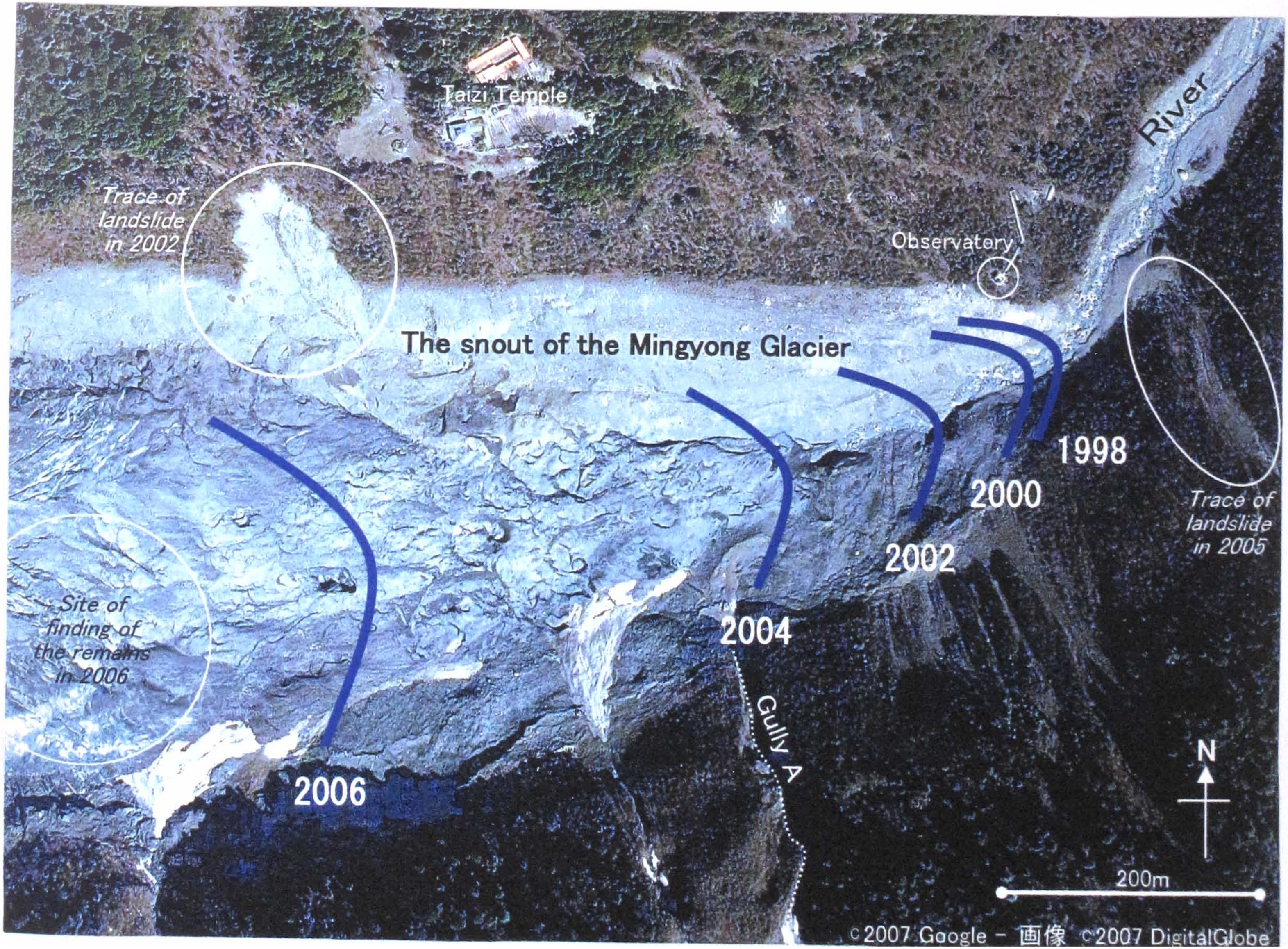


2000



2004

Meili Snow Mountains – Minyong Glacier


Taizi Temple
River
Trace of landslide in 2002
Observatory
The snout of the Mingyong Glacier
1998
2000
2002
2004
2006
Trace of landslide in 2005
Site of finding of the remains in 2006
Gully A
N
200m

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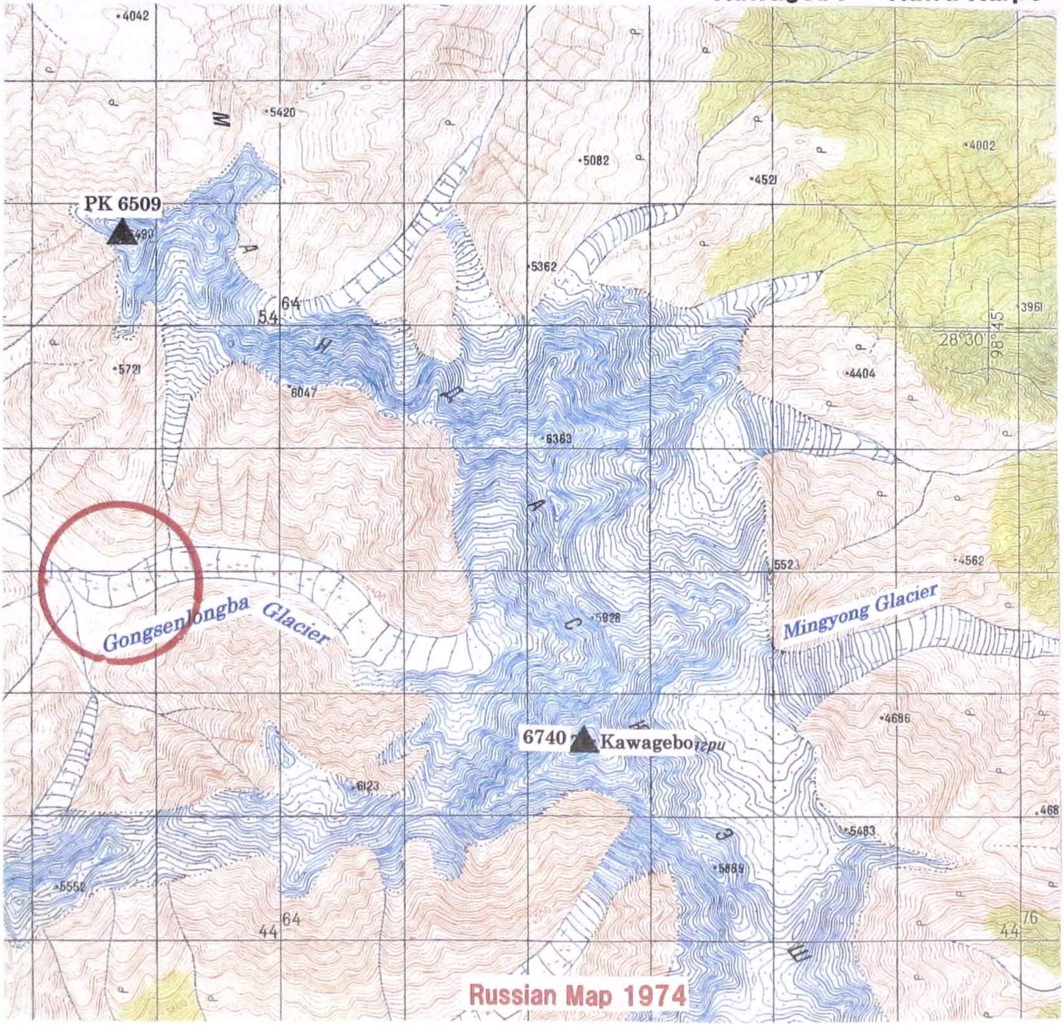
Glacier in NW side of Holy Peak Kawagebo

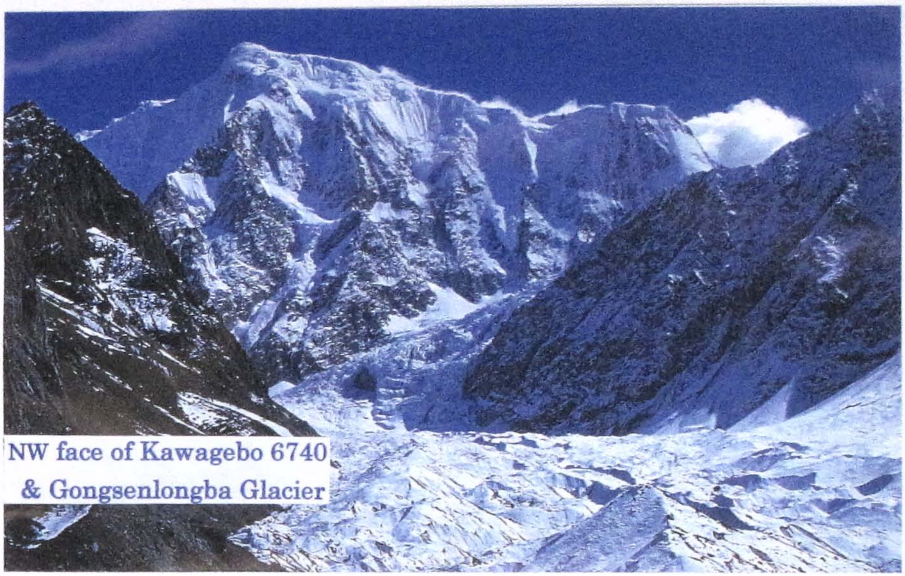
- Meili Snow Mountains on Mekong-Salween Divide -

The glacier is called Gongsenlongba Glacier, the headwaters of which is in the northwestern face of the highest peak Kawagebo 6740m. Comparison of the Russian map 1974 and Landsat 2003 indicates that the glacier retreated about 400m in 30 years.

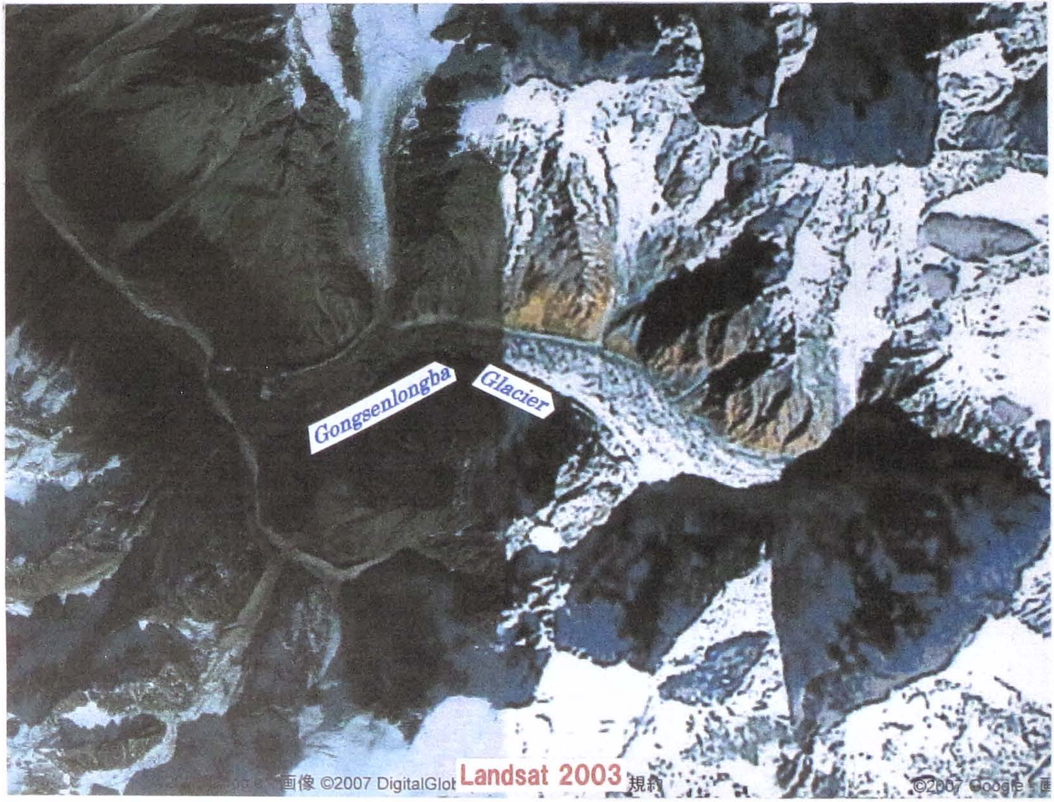
Kawagebo = Kawa Karpo



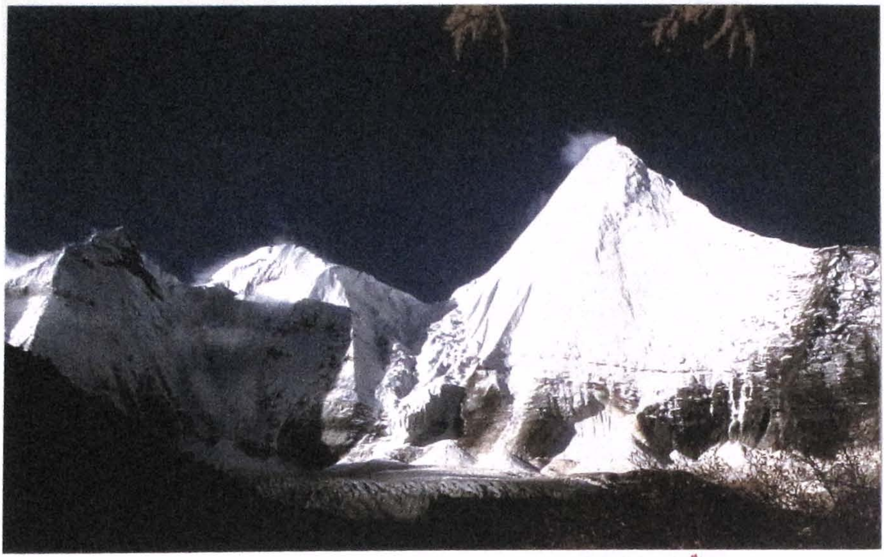
Russian Map 1974



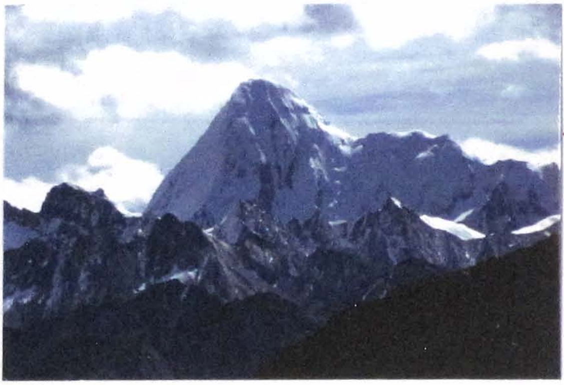
NW face of Kawagebo 6740
& Gongsenlongba Glacier



Holy Yangmaiyong 5958m, East face, Gongga Xueshan, Sichuan



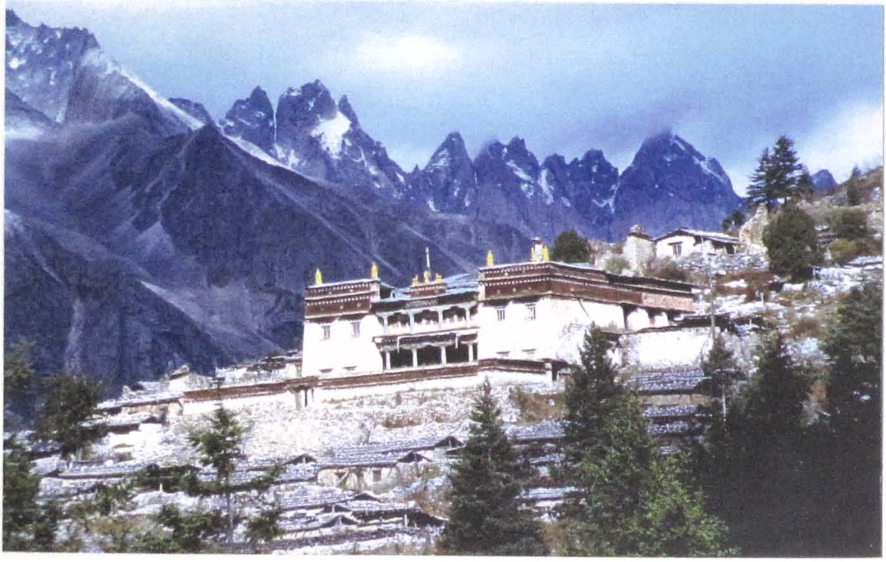
Genyen 6204m, West face, Sichuan



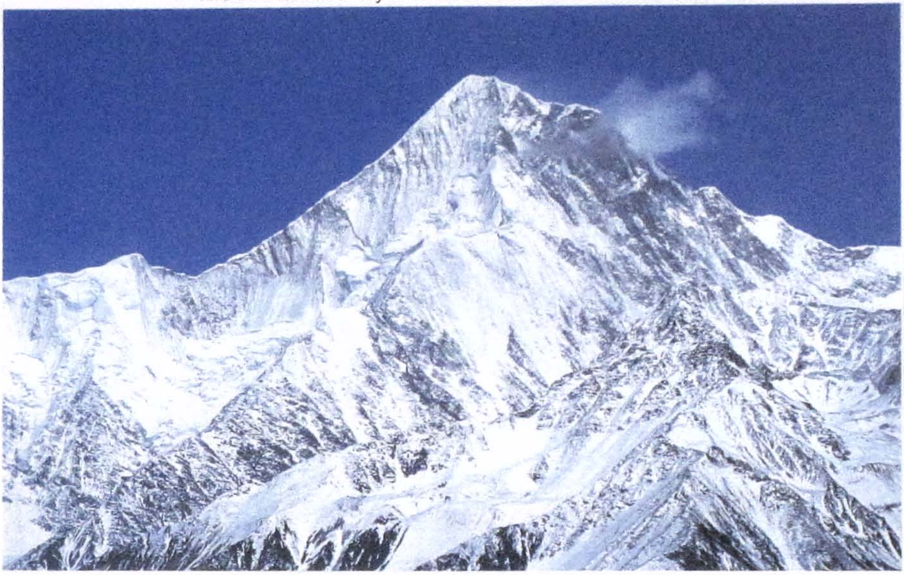
Charlie Fowler & Chris Boskoff made near ascent in 2006

Charlie Fowler & Chris Boskoff were lost in 2006

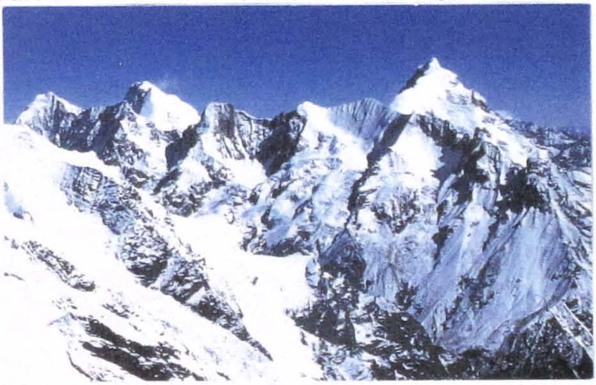
Historical Rengo Monastery near Genyen, Sichuan



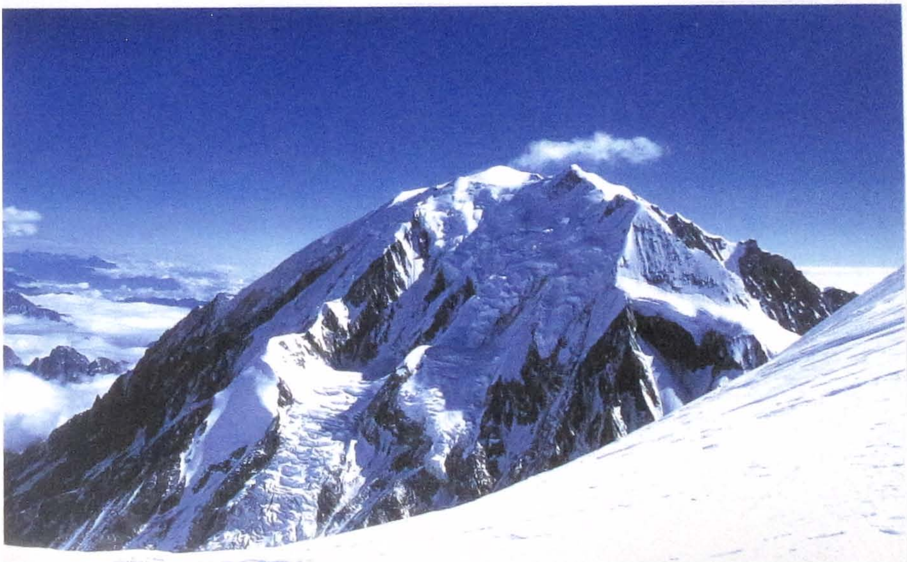
The W Face of Minya Konka 7556m from Zimei Pass

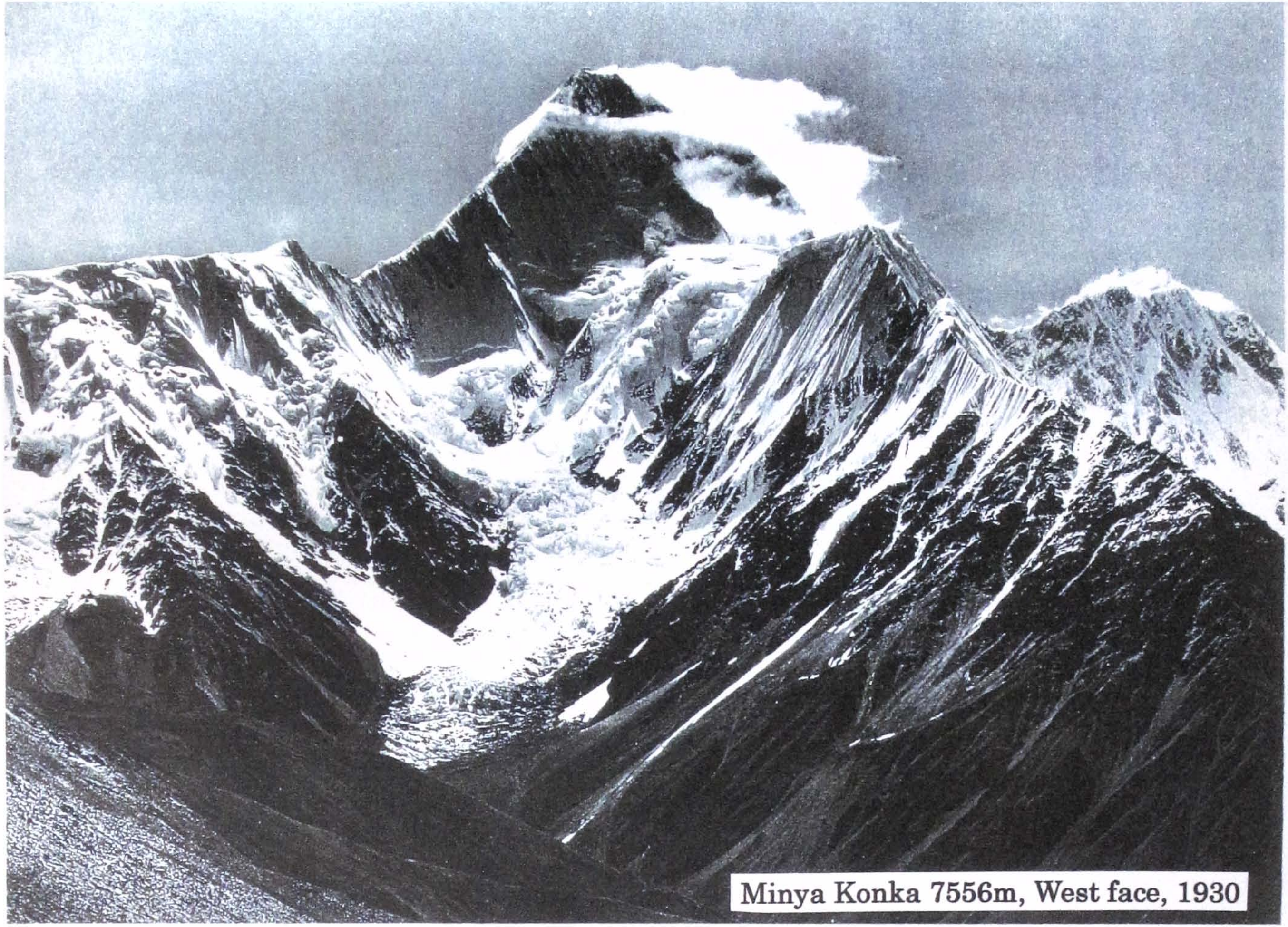


Panorama of Minya Konka satellite peaks from Minya Konka NW ridge.
The S Face of Glosvenor 6376m, Jiaz 6540m, Mt. Edger 6618m from left.



The W Face of Zhongshan 6886m, Minya Konka satellite peak





Minya Konka 7556m, West face, 1930

Glaciers in Minya Konka (Gongga Shan)

-Daxue Shan Range in Henduan Mountains-

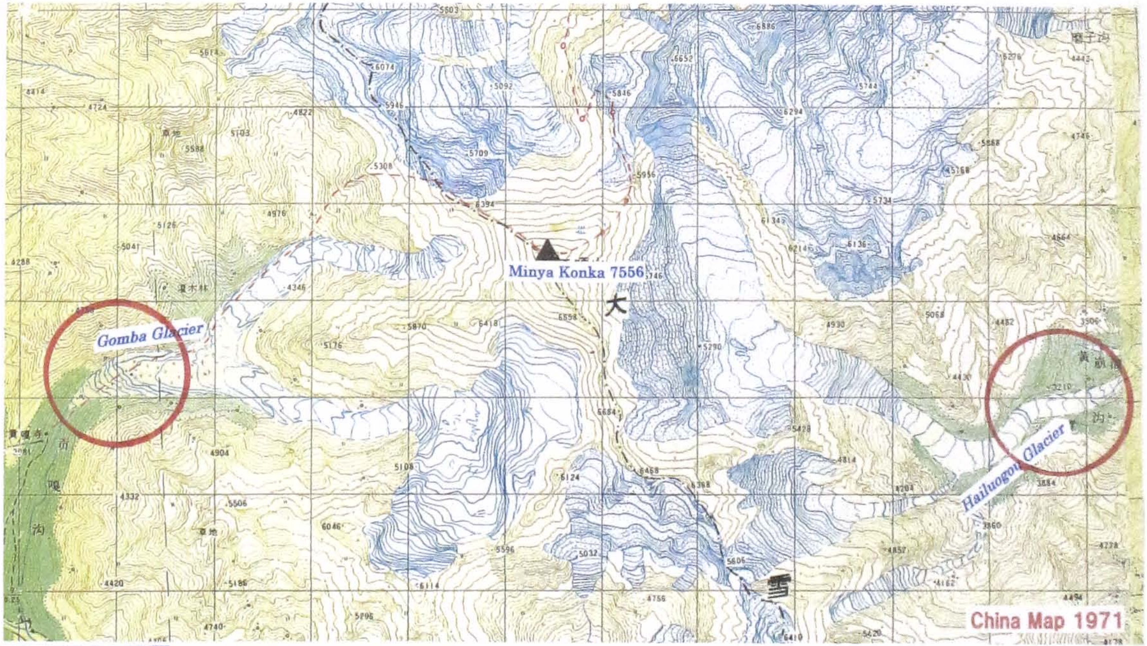
Comparison - China Map 1971 & Landsat 2003

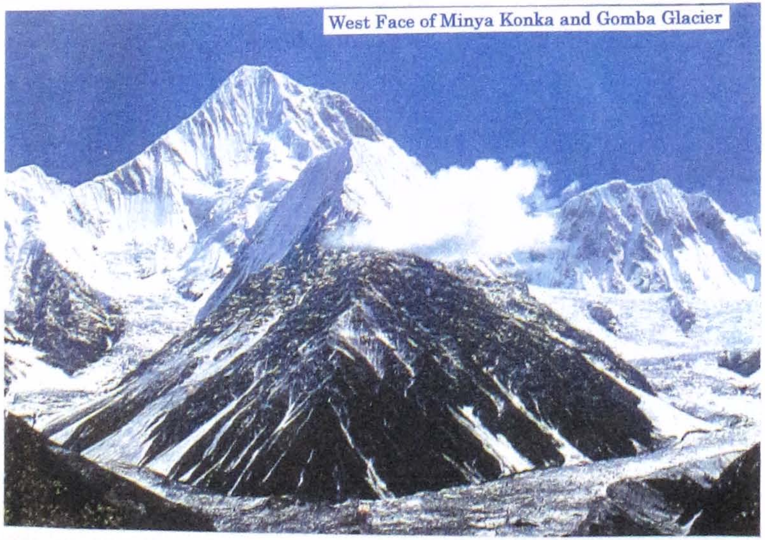
1. Hailuoguo Glacier:

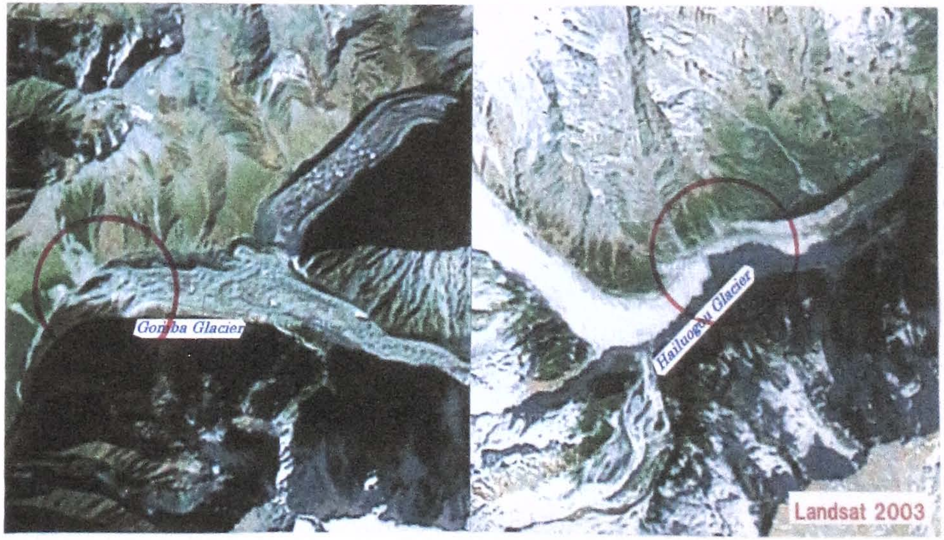
   Not much retreat of the glacier is seen in 32 years, but in some section it became narrower.

2. Gomba Glacier:

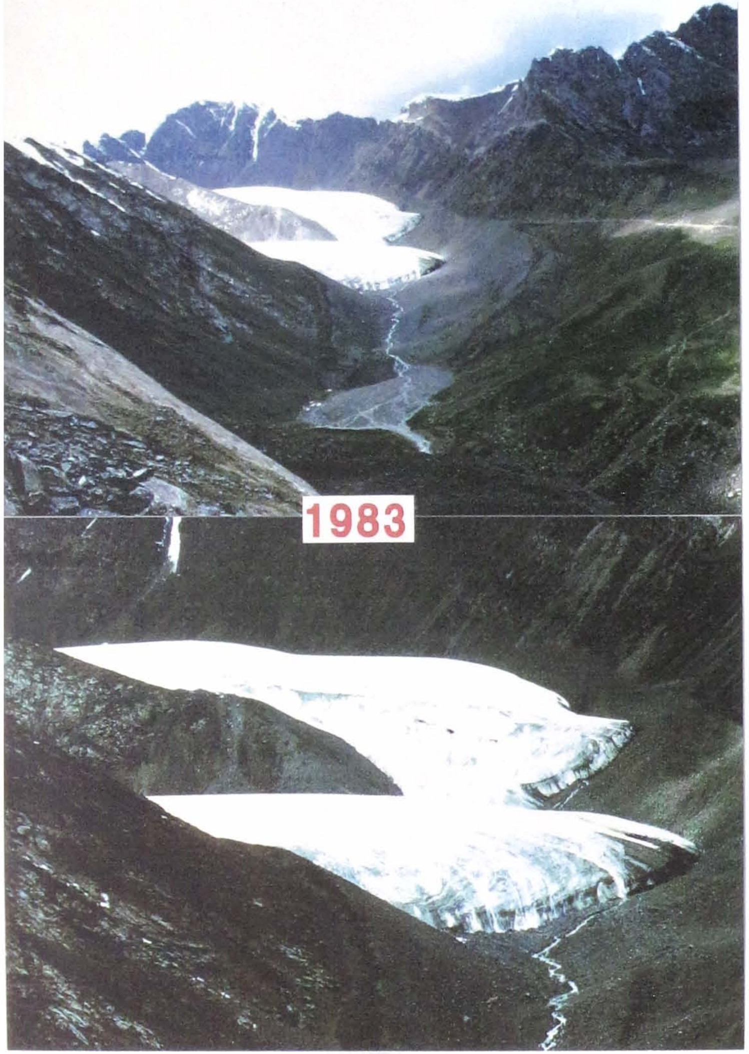
   The glacier retreated by 1km in 32 years.

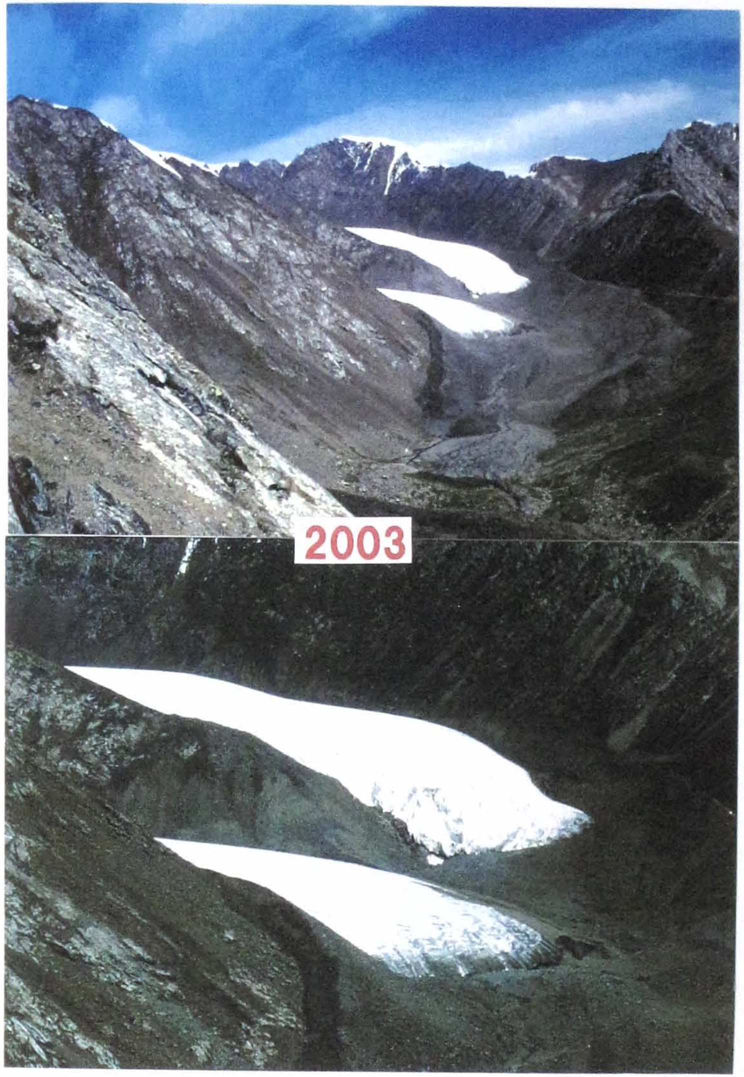






Glaciers Retreat in Tian Shan in China (1)

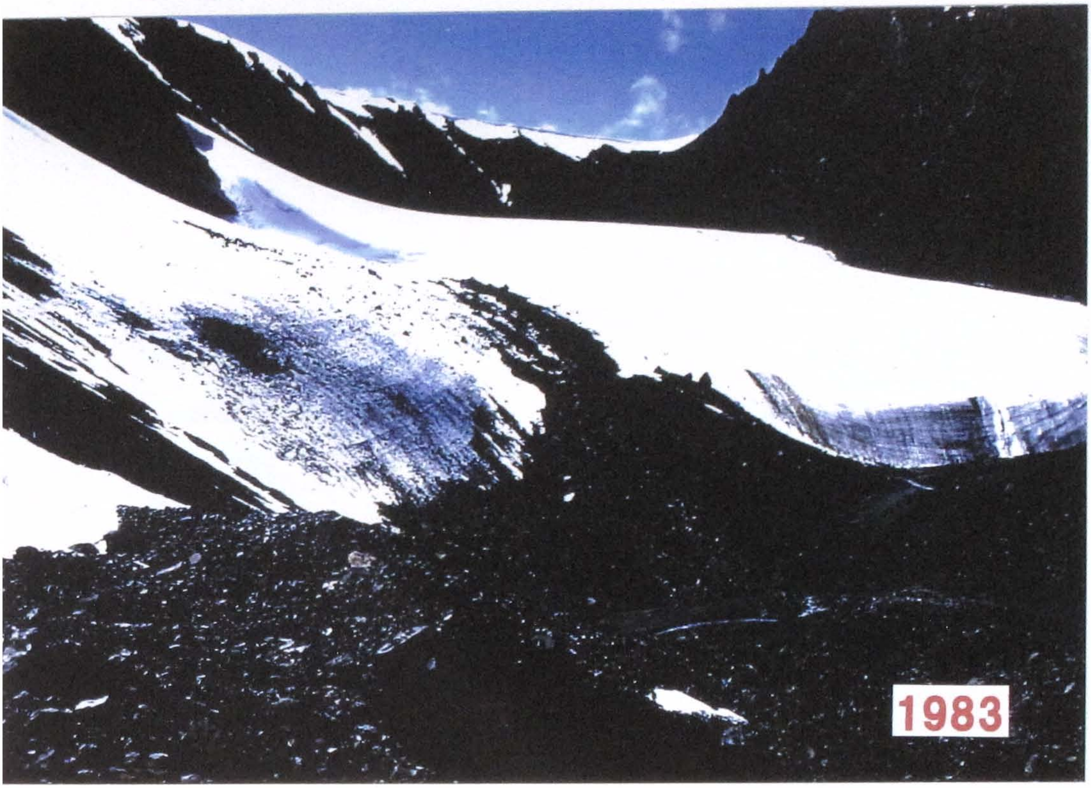

1983

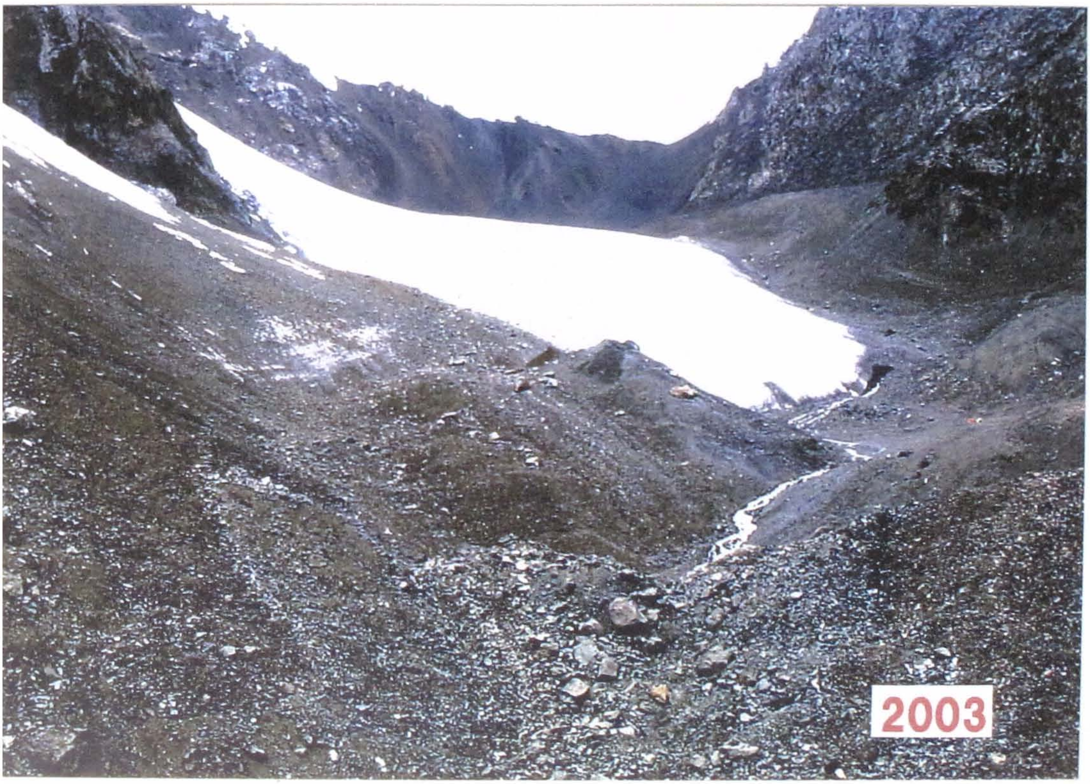

2003

During the past 40 years, much of the volume of the small glaciers in the headwaters of the Urumqi River, in the Tianshan Mountains has been lost. Some small glaciers have already disappeared. (Prof. Shuji Iwata)

(Photo: Prof. Shuuji Iwata)

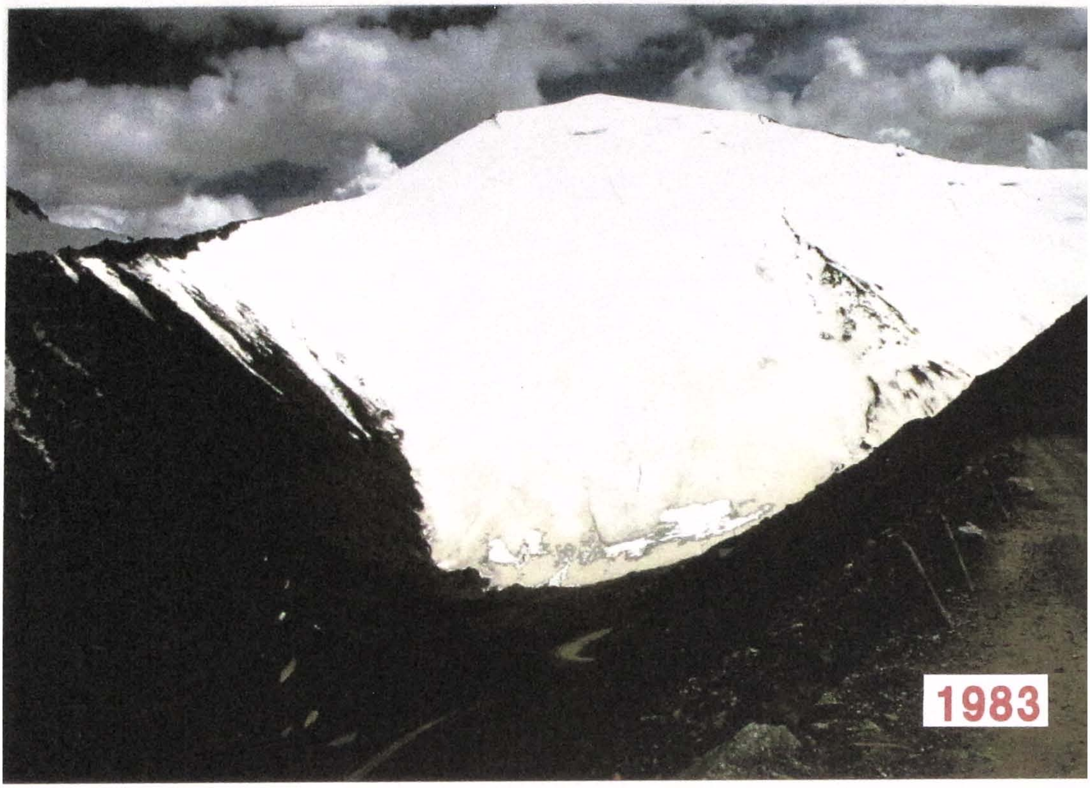
Glaciers Retreat in Tian Shan in China (2)

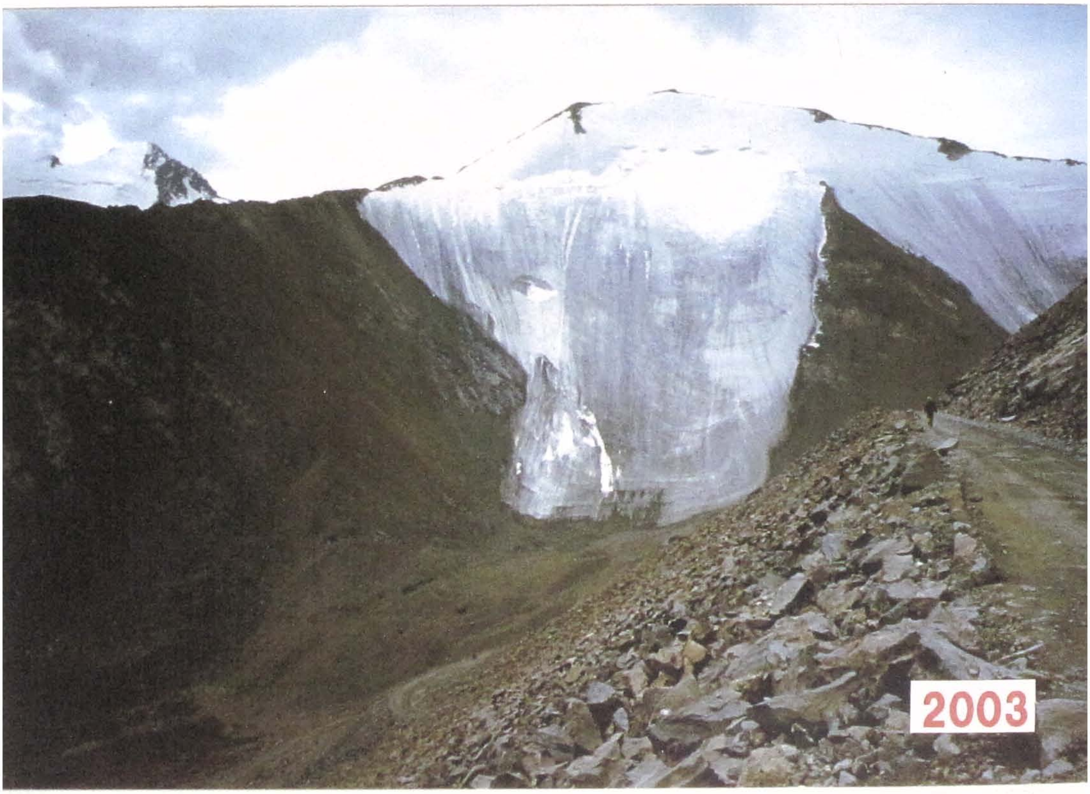




(Photo: Prof. Shuuji Iwata)

Glaciers Retreat in Tian Shan in China (3)





(Photo: Prof. Shuuji Iwata)